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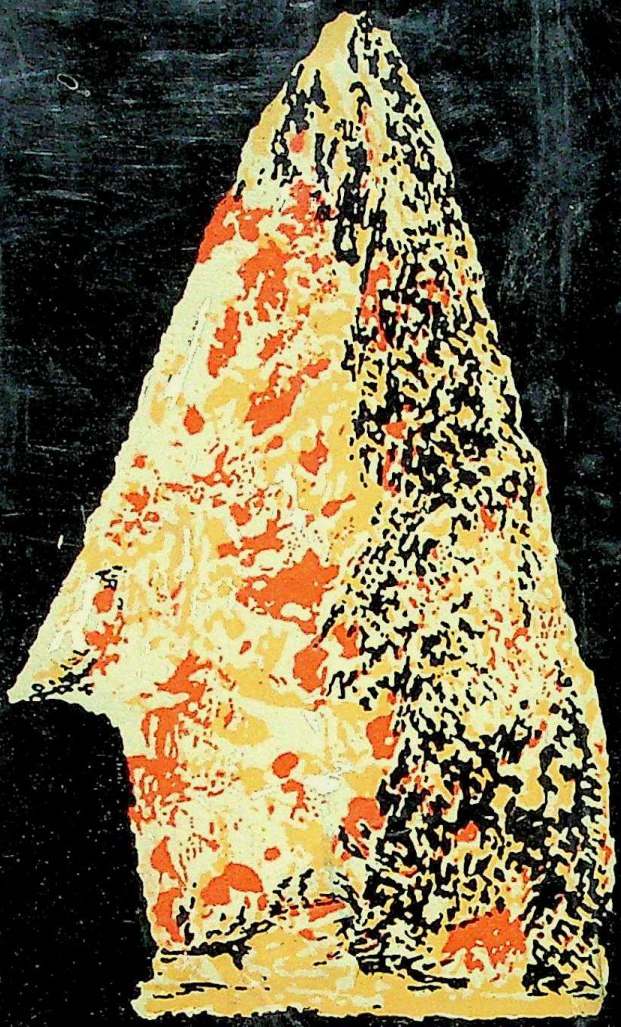

THE IRON AGE IN INDIA

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THE IRON AGE IN INDIA

BY

N. R. BANERJEE

ARCHAEOLOGICAL SURVEY OF INDIA, NEW DELHI

WITH A FOREWORD BY

Professor ROBERT HEINE-GELDERN

MUNSHIRAM MANOHARLAL

ORIENTAL PUBLISHERS & BOOKSELLERS

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TO

MY PARENTS.

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FOREWORD

I still recall the stimulating discussions I had with Dr. Banerjee on the occasion of his two brief visits to Vienna. The excellent lectures he delivered here at the University and at the Museum of Ethnology made a great and lasting impression on the audiences and are still well remembered. It was, therefore, with genuine pleasure that I accepted his invitation to contribute a brief foreword to the present book.

The distinction of Dr. Banerjee's archaeological researches in southern India and at Ujjain and Nagda is well known. His way of combining archaeological and literary evidence is exemplary and has yielded convincing results. The width of his knowledge in the fields of Near Eastern archaeology and history and of European prehistory speaks for itself.

I agree with Dr. Banerjee's conclusion that the Aryan migration from western Asia to India was caused by the Thraco-Phrygian invasion of around 1200 B.C. and that at the time in question the Aryans must already have known iron. I am not so sure that they were truly familiar with the respective techniques at such an early date. Moreover, they may have experienced difficulties in locating iron ores in their new surroundings. In view of the time gap between the arrival of the Aryans in India and the first archaeologically proved appearance of iron around 1000 B.C. the possibility of some new cultural impulse from the west around this date may, therefore, be considered. This is, of course, only my personal view, and Dr. Banerjee's opinion in this respect is as good as mine. New discoveries may eventually close the gap and show that he is right. Be this as it may, the fact that iron was used in India in the 10th century B.C. is in itself of eminent importance and will force archaeologists to revise some current views.

I have little doubt that the author is right in attributing the Painted Grey pottery of northern India to the early Aryans, or at least to one group of Aryans, since it is possible and even probable that other groups used different types of ceramics. As Dr. Banerjee remarks, migrating peoples may frequently have adopted the pottery styles prevailing in their new habitat, modifying them in order to meet their tastes. This point of view may help to solve a number of puzzling problems concerning the prehistoric and protohistoric archaeology of India.

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Dr. Banerjee has again taken up the question of the megalithic culture of southern India. He derives it from the cairn-burial culture of Baluchistan and dates its arrival in India around 700 B.C. I came to very similar results in a not yet published paper which I read at the International Congress of Iranian Art and Archaeology in New York in 1960, except that I am inclined to assume a somewhat later date, 600-400 B.C. In the mean-time Dr. Walter Fairservis of the University of Washington in Seattle told me that he had discovered a ruined port-hole cist in the surroundings of Karachi. This new link between the port-hole cists of southern India, the port-hole slab graves at Tepe Sialk and the port-hole dolmens of the Caucasus would seem to indicate that Dr. Banerjee's and my own conclusions concerning the origin of the megalithic culture of the Indian peninsula may be correct, even though final proof is still missing.

In reading Dr. Banerjee's chapter on life in the early Iron Age of India one cannot help being reminded of the enormous advance made by Indian archaeology in recent years. Twenty years ago practically no remains were known that could have helped to bridge the gap between the Harappa civilization and the Mauryans and to illustrate the material side of life during the Vedic and pre-Asokan Buddhist periods. Our knowledge in this respect was almost exclusively derived from literary sources. Due to the work accomplished by Indian archaeologists this has decisively changed. Dr. Banerjee's book, too, constitutes an important and most welcome contribution towards our better knowledge of the periods concerned.

Vienna, January 1964 ROBERT HEINE-GELDERN

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PREFACE

Eleven years ago, in 1954, on a fine autumn day, Professor Humayun Kabir, while being shown round an annual exhibition at New Delhi of the latest archaeological discoveries and excavated remains, organized by the Archaeological Survey of India, shot a question at me. "How old is iron or steel in India?", he asked. The question took me completely unawares and found me speechless, and the ground seemed to slip from under my feet. In fact, there was no proper answer to the question then. This query, nevertheless, planted a seed of enquiry into my mind, and I decided to pursue the problem assiduously. And very soon an opportunity played into my hands. The much sought after evidence showed up in the excavations at Ujjain conducted by me as Superintendent of the Excavations Branch of the Archaeological Survey of India during 1956-58. This book resulted from subsequent researches.

For this work I am indebted to several friends, colleagues and scholars in various ways. It was Professor N. R. Ray, of the Calcutta University, who gave me the idea of working on the subject as a thesis, as far back as 1958, during his visit to the excavation camp at Ujjain, where the third season of my work there was then on. The inspiration came, no doubt, from the large-scale discoveries of iron objects in the excavations at Ujjain, which Professor Ray himself witnessed. This led initially to the writing of a long paper on the Advent of the Iron Age in India. But Shri A. Ghosh, Director General of Archaeology in India, to whom I gave it for publication in the *Ancient India,* suggested a more comprehensive work on the subject.

Shortly afterwards, early in 1959, I was deputed to West Germany under a scholarship scheme of the German Academic Exchange Service for a study of Assyriology. This gave me an opportunity to come into contact with the European scholars, and also to look into the evidence from West Asia at first hand.

I am grateful to my Professor, Dr. Anton Moortgat of the Free University of Berlin, for going through the tentative paper and for making many valuable suggestions. During my European sojourn, I have had the opportunity of discussing the question with several scholars of international reputation including Sir Mortimer Wheeler of London, Professor Louis Renou of the Sorbonne, Paris, Professor A. Alsdorf of Hamburg, Professor W. Hofmann and Professor Walter Wuest of Munich, West Germany,

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Professor Robert Heine-Geldern of Vienna, Austria, and Professor (Mrs.) J. E. van Lohuizen de Leeuw and Professor R. J. Forbes of Amsterdam, Holland. Most of them agreed with my point of view and all offered helpful suggestions. At this time I was able to collect an extensive bibliography of work on the subject under research published by European scholars, but was prevented from doing anything more substantial by my engagement on studies of Assyriology at the Free University in Berlin.

On my return to India in April 1960, I tried in vain to obtain the vast references for consultation in India. My chances of completing the work in hand appeared very bleak, when an opportunity to visit Europe a second time presented itself. I was to be India's delegate to the first International Conference on Megaliths held in Paris in February 1961, thanks to Shri A. Ghosh and Professor A. Varagnac of St. Germain-en-Laye, France. Professor J. E. van Lohuizen de Leeuw, who had taken considerable interest in my work, persuaded the Dutch Government to offer me a Fellowship for completing my researches on the Iron Age in India, after the megalith conference, for a period of three months. I was able to look up all the outstanding references during this period at Amsterdam and Leyden, in Holland, thanks to Professor Lohuizen de Leeuw and the Dutch Government. It is gratifying to record that the staff of the University Library at Amsterdam became familiar with my quest and often voluntarily brought new works on metallurgy or Iron technology to my notice.

Earlier, Professor E. Boehringer, formerly President of the German Archaeological Institute, whom I had met in India at Ujjain in 1957, had taken considerable interest in my work and had put me in touch with Dr. S. Junghans of the State Museum of Stuttgart, who had been doing some good work on the spectroscopic analysis of metals. I have had the benefit of a discussion with him on these aspects of the study.

The contacts with the German Archaeological Institute brought me into touch later with Professor Dr. K. Bittel, the successor of Professor Boehringer at the German Archaeological Institute. Having worked at Boghaz Keui, in Turkey, the seat of the Indo-European Hittites, for nearly two decades, he took considerable interest in my work and offered me a Fellowship to travel through Europe and the Near East in order to enable me to discuss the question with the concerned scholars and also see the excavated sites and museums connected with the problem. I cannot thank him adequately for his help and interest.

As a result of this helpful gesture I was able to travel exten-

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sively through Europe and West Asia in furtherance of my researches, after the completion of the library work in Amsterdam, in June 1961.

During my second visit to Europe, I made the acquaintance of Professor F. B. J. Kuiper of Leyden, Holland, and Mr. H. H. Coghlan of the Borough Museum, Newbury, Berkshire, England, both of whom offered valuable suggestions on different aspects of the problem, the former on the *Vedic* and Aryan problems and the latter on the metallurgical aspects of the study.

I am grateful to all these scholars for their interest in my work and for the help they have rendered and to the Dutch Government and the German Archaeological Institute, Berlin, respectively, for offering me Fellowships which made the researches possible.

I am particularly grateful to Professor Forbes of Amsterdam for going through my earlier essay and making useful suggestions and for allowing me the privilege of using his private library. My special thanks are due to Professor Th. Galstin of the Kern Institute of Leyden for allowing me free and unfettered access to the Kern Institute Library at Leyden by providing me with its keys.

To Sir Mortimer Wheeler I owe my thanks specially for going through my earlier paper and for various suggestions conveyed periodically in correspondence.

Thanks are also due to Professor Otten of Marburg-am-Lahn, West Germany, for bringing to my notice the interesting work of E. Laroche on the inscriptional references to the use by the Hittites of iron in *Revue Hittite and Asianique,* Vol. XV.

I have also discussed the problem with Professor R. Ghirshman and Professor C. F. A. Schaeffer of Paris with advantage, to both of whom I am grateful. I must acknowledge with gratitude the kind permission so readily accorded by Professor Schaeffer to quote freely from his numerous works and use whatever interested me, particularly the illustration (fig. 22) of a composite axe from Ras Shamra.

A discussion with Mr. David Strohnach of the British School of Archaeology at Tehran towards the end of my West Asian sojourn has cleared many obscure points, which I gratefully acknowledge.

Among my Indian colleagues, Shri K. R. Srinivasan had taken the trouble of going through the earlier paper and making many useful suggestions. Dr. D. C. Sircar, then Government Epigraphist for India in the Archaeological Survey of India and now Carmichael Professor of the Calcutta University, had also gone through

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the paper and agreed with its conclusions. I am grateful to them both.

I avail myself of the opportunity to express my gratitude and thanks to Shri A. Ghosh, Director General of Archaeology in India, for his interest in the work, and for allowing me to submit the work as a thesis for the D. Phil. degree of the Calcutta University and subsequently to publish it. To him I am also grateful for permitting me to use the following blocks belonging to the Archaeological Survey of India: pls. III and IV, and figs. 19 and 20, and for all the photographs.

I am thankful to the Registrar, Calcutta University, for permitting me to publish the thesis approved by the University for the D. Phil. (Arts) degree.

To Professor H. D. Sankalia I am particularly beholden for permitting me to utilize the discussions at the Poona Seminar on Prehistory and Protohistory and incorporate the relevant points in the penultimate chapter, on the Fresh Light on the Problems of the Iron Age in India.

I cannot express in words my sense of gratitude to Professor Dr. Robert Heine-Geldern for favouring me with a foreword.

There are numerous others, including my young colleague and friend, Shri H. Sarkar, and Shri Devendra Jain of the publishing firm, to whom I am indebted in ever so many ways for help rendered in seeing the book through the press, and I avail myself of the opportunity to thank them all.

The map showing the distribution of iron ores in the Indo-Pakistan subcontinent (fig. 17) is published with the kind permission of the Council of Scientific and Industrial Research, New Delhi.

I am greatly indebted to my wife, Shrimati Pratima Devi, for her deep interest in the work and for much encouragement throughout its writing and 'for many silent hours'.

To my father, Shri Srikanta Banerjee, in particular, I owe the fulfilment of the undertaking as the redeeming of a pledge, in this visual form, since it was his intense interest in research in general and constant inspiration and blessings in unbounded measure that have sustained me throughout.

October 1965

N. R. BANERJEE

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5 The miscellany of iron objects from sites in Iran. See Chapters 5 & 11.

6 The miscellany of iron objects in the N.B.P. Ware levels. See Chapters 7 & 11.

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ABBREVIATIONS

Amer. Journ. Arch.	:	American Journal of Archaeology
Ann. Bhand. Inst.	:	Annals of the Bhandarkar Institute
An. Bibl. Ind. Arch.	:	Annual Bibliography of Indian Archaeology, Kern Institute
A. I.	:	Ancient India
A. I. H. T.	:	Ancient Indian Historical Tradition
Arch. Surv. Ind. An. Rep.	:	Archaeological Survey of India, Annual Reports
Arch. Surv. Ind. Imp. Ser.	:	Archaeological Survey of India, Imperial Series
Bull. Amer. Inst. Iran. Art and Arch.	:	Bulletin of the American Institute of Iranian Art and Archaeology
Bull. Geol. Surv. Ind.	:	Bulletin of the Geological Survey of India
Bull. Nat. Inst. Sciences Ind.	:	Bulletin of the National Institute of Sciences of India
Corp. Ins. Ind.	:	Corpus Inscriptionum Indicarum
D. K. A.	:	Purana Text of the Dynasties of the Kali Age
Ep. Ind.	:	Epigraphia Indica
I. A.	:	Indian Archaeology—A Review
Ind. Ant.	:	Indian Antiquary
I. H. Q.	:	Indian Historical Quarterly
J. A. S.	:	Journal of the Asiatic Society
J. A. S. B.	:	Journal of the Asiatic Society of Bengal
Journ. Ind. Anthrop. Ins.	:	Journal of the Indian Anthropological Institute
J. I. S. O. A.	:	Journal of the Indian Society of Oriental Arts

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J. R. A. I.	:	Journal of the Royal Anthropological Institute
J. R. A. S.	:	Journal of the Royal Asiatic Society
J. Bom. Br. R. A. S.	:	Journal of the Bombay Branch of the Royal Asiatic Society
M. A. S. I.	:	Memoirs of the Archaeological Survey of India
Miscellanea Amer. Phil. Soc.	:	Miscellanea of the American Philosophical Society
N. B. P. Ware	:	Northern Black Polished Ware
Periplus	:	Periplus of the Erythaean Sea
P. H. A. I.	:	Political History of Ancient India
S. B. E.	:	Sacred Books of the East
W. Z. K. M.	:	Wiener Zeitschrift fuer Kunde des Morgenlandes

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CHAPTER 1

INTRODUCTORY—PROBLEMS OF THE IRON AGE TECHNOLOGY AND CHRONOLOGY

ONE of the most important technological advances of mankind is the mastery of iron and the introduction of what may be archaeologically described as the Iron Age. This gave man a very useful metal that could at once achieve adequate hardness or sharpness to meet nearly all his requirements in peace and war, and was yet more serviceable than copper or bronze which were discovered and worked earlier. Archaeological discoveries have shown that iron did not make its appearance in human use simultaneously everywhere, nor even over a large part of the world. On the contrary, it is known to have made humble beginnings in one or more centres and to have played a minor or subordinate role alongside copper or bronze, often as a precious metal or with magic properties, for several centuries.

Iron could not for long replace copper or bronze in hardness or sharpness. This was due largely to the fundamental difference in the metallurgy of iron from that of copper or bronze. While the primitive furnaces could produce temperatures high enough to smelt copper ores, they were not capable of achieving the temperature required to smelt ores of iron. Though in the case of copper the molten metal could be poured into moulds, and objects of desired shapes easily produced, the workable material from iron ores obtained by the application of heat was in the beginning a softened spongy mass. This had to be hammered to be shaped into objects of choice. Being unmixed with carbon this new metal did not have the sharpness or hardness which could be achieved with copper or bronze. It was only gradually, through trials and errors, not always consciously or deliberately made, and not unoften aided by lucky accidents, that the high temperature of 1535° centigrade required to smelt iron and the use of a catalytic flux to produce a slag and thus separate molten iron from impurities were slowly achieved.

This was, however, not the end of the story. The iron metal so produced was yet soft in comparison with copper or bronze. It was not until the achievement of the characteristic hardness as the result of the admixture of carbon in proper proportion

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that the special properties of iron in the service of man had been fully realized.

Iron produced by smelting is now known to be of three kinds[1], namely, (i) wrought iron with little or no carbon, i.e., about 0.08% or lower, (ii) cast iron with up to 7% of carbon, which renders it hard but brittle, and (iii) steel, with up to 1.7% of carbon, which makes it hard but not brittle. It was only after at least the basic principles of the manufacture of some kind of steel through carburization had been discovered that iron could effectively replace copper or bronze as the main metal in human use. Apart from this 'steeling' of iron, the principles of 'quenching' and 'tempering' had also to be achieved; and possibly these processes had been discovered earlier than full-fledged 'steeling', as these steps also served to furnish the objects of iron with a degree of hardness, superior to that of copper or bronze.

'Quenching' consists in immersing the red-hot metal into water, which results in hardening of the metal. Similar practice has the reverse effect on copper or bronze. 'Tempering' is tantamount to localized steeling of iron, and consists in repeated heating of the metal and allowing it to cool slowly while it is hammered. In the process some carbon from the furnace gets impregnated into the metal, though not uniformly, imparting to it the properties of steel.

It must be recognized at once that long before ores of iron came to be smelted and worked the limited use of meteoric iron was already known. But the utilization of meteoric iron has to be distinguished from the employment of man-made iron by the deliberate smelting of iron ores which the latter implied. The mere acquaintance with the use of man-made iron was not also enough to usher in the Iron Age. It cannot be said to have commenced its course until it had assumed its dominant rôle in man's life by the displacement from that position of honour of copper or bronze. But this important transformation began in different countries at different times, sometimes independently, but more often depending for its inspiration upon a neighbouring pioneer.

The evidence on the beginnings of the Iron Age in India has not yet been correlated to produce a well-knit and continuous picture of the technological advance accompanying the coming of iron into this land. The problem is of extreme importance in the country's history of technology, for it is not known for certain as to how and when iron came to be introduced into this subcontinent. It is at the same time beset with many difficulties, which comprise, apart from the disjointed nature of the evidence on the chess-board of India's geography, the inadequacy of the data on the technological processes and also the uncertainty of

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the chronological assessments of the different cultural levels where iron has occurred. Nevertheless, some recent discoveries have made the task easier in regard to both the correlation of the earliest iron-bearing deposits in different parts of the country as well as to their chronological estimation. In regard to the technological processes, the outstanding problem remains in respect of the composition of the objects as of ores from the neighbouring regions for lack of adequate facilities for spectral analysis, making it difficult, if not impossible, to relate or connect the finished goods to the sources of ores. The method of smelting, however, is indicated to an extent by the evidence at Ujjain and the prevailing practice of smelting of iron ores among the primitive tribes, which by tradition has a long ancestry. The evidence on 'carburization', 'quenching' and 'tempering' being inadequately represented, no more than broad generalizations are at present possible in regard to these fundamental technological processes.

The present dissertation concerns itself, in the main, with the beginnings of the Iron Age in India and its coming into its own, both of which took place within the confines of the first millennium B.C.

NOTES AND REFERENCES

1. M. S. Krishnan, *Bull. Geol. Surv. Ind.*, no. 9, Iron-Ore, Iron and Steel, 1954, pp. 28 and 30.

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CHAPTER 2

EARLY EVIDENCE OF THE USE OF IRON IN INDIA

A. Iron in Association with the Painted Grey Ware Ceramic

In north India the earliest occurrences of objects of iron or objects proving its manufacture and use have been recently discovered at four sites, namely, Hastinapura and Alamgirpur, in District Meerut, Kausambi, in District Allahabad, all in Uttar Pradesh, and at Ujjain, in District Ujjain, Madhya Pradesh. In all these sites iron objects occur for the first time in association with a later phase of the distinctive ceramic known as the Painted Grey Ware (fig. 1 & table 1). Stratigraphically the Painted Grey Ware and the associated cultural assemblage are lower, and, therefore, earlier than the now well-known Northern Black Polished Ware. As stated above, these evidences constitute also the earliest in India's stratigraphy, even when compared with the early appearance of iron elsewhere in India in regions which are geographically unconnected with or disjointed from the distributional zone of the Painted Grey Ware (fig. 18).

The evidence of the use of iron in each of the above-mentioned sites is considered below:—

(i) *Hastinapura*

The evidence at Hastinapura is confined to a couple of slags of iron[1] found at a late or upper level of the Painted Grey Ware deposit (Period II of Hastinapura). Though no actual objects were found at the site at this Period, the importance of the mere slags cannot be minimized. While the presence of actual objects may be held as the result of importation from elsewhere, the slags suggest local manufacture.

(ii) *Alamgirpur*

At Alamgirpur[2] iron objects comprising a spear-head, a barbed arrow-head, nails and pins occurred throughout the 4½ ft. (± 137 cm.) thick deposit of the Painted Grey Ware and associated cultural assemblage (Period II of Alamgirpur).

(iii) *Kausambi*

In Kausambi small fragments and shapeless bits of iron[3] were

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discovered as early as the third of the four structural periods within the first period of occupation on the site, which was clearly pre-Painted Grey Ware[4] in the interpretation of the excavator. More distinctive shapes occurred in the second Period of occupation, which was associated with the Painted Grey Ware, and continued in the succeeding Period, characterized mainly by the N.B.P. Ware.

The evidence at Kausambi tends to show an even earlier emergence of iron than the Painted Grey Ware on the site, and it might *prima facie* be construed, on this showing, as the earliest stratigraphical evidence of iron so far known in India. It should, however, be borne in mind that the nature of the objects from the earliest phase on the site was fragmentary and shapeless. Moreover, the Painted Grey Ware itself, on the basis of its simpler painted designs, confining themselves to rim bands, compared with the larger stratigraphic evidence at Hastinapura, is somewhat later at Kausambi. Thus the evidence of iron at Kausambi accords well with the evidence at Hastinapura or Alamgirpur described above.

(iv) *Ujjain*

The evidence at Ujjain[5], however, is the most prolific and consists of spear-heads, arrow-heads and knives for domestic use in the deposits of the earliest period of occupation on the site, called Period I, besides some iron objects suggesting crowbars and a spade found in the body of the mud-rampart surrounding the city from a little after the earliest settlements. The occurrence of a Painted Grey Ware sherd in the make-up of the rampart, as well as some surface finds, and a few from the earliest period of occupation, occurring stratigraphically below the deposits of the cultural complex characterized by the N.B.P. Ware, point to the actual horizon of the iron objects on the site. This is broadly in consonance with the evidence in the Ganga plain. Iron becomes, of course, more prolific in the N.B.P. Ware Period at Ujjain, as is generally the case everywhere in India.

To sum up: by the time the distinctive cultural phase of the N.B.P. Ware had been reached in north India iron became very common and easily the dominant metal, being available in diverse shapes and in large numbers. The data are too multitudinous to be described here and will be dealt with at some length in Chapter 7. Even so the quantum of remains unearthed, though representing but a fragment of the total quantity, is apparently much less than the metallic equipments actually used at this time. This may, no doubt, be attributed to an extent to rusting and resultant degeneration. In contrast the well-preserved

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condition of the equipment of iron objects to be met with in the megalithic tombs of south India is naturally the result of careful storing and sealing. Wheeler has endeavoured to explain this contrasting experience in the following words, "Its (iron's) impressive quantity and quality owe much to the accident of preservation in protective (megalithic) tombs. The scrappy remains of iron-work from the 'megalithic' levels of the Brahmagiri town would never, unsupported, have suggested the extent of the industry. *Per contra*, had megalithic tombs been built beside the Gangetic cities of the Iron Age, there can be no doubt that their display would have been correspondingly striking."[6]

It would be worthwhile at this stage to note that the Painted Grey Ware has been attributed by Lal[7] to the Aryans[8] and has been dated by him to *circa* 1100-800 B.C. Neither this identification nor the chronological assessment proposed by him has been finally accepted yet. These two significant aspects of the question will be dealt with in a subsequent chapter. Meanwhile, the other evidence of the early occurrence of iron in India should claim prior attention.

B. Iron in the Megalithic Burials of South India

Until almost quite recently the occurrence of large assemblages of iron equipments comprising, among others, full-length spears, daggers, arrow-heads, horse-bits and wedges in fairly good state of preservation in the megalithic tombs of south India (figs. 2 & 3 and table 2), were considered as the earliest evidence of iron in India even though the megaliths have been dated no earlier than *circa* 300 B.C.[9] It was also stated by one authority[10] writing in 1950 that no material evidence was yet available "of the use of iron by anyone in India or Pakistan prior to 250 B.C.", apart from the evidence in the megalithic tombs and the cairns of Baluchistan. His exact words are quoted here for emphasis: "there being not one single object or even fragment of iron as yet found north of the Narbada and the Mahanadi which can be referred to a date earlier than 250 B.C."[11] More recently Wheeler has postulated that it was the Achaemenid Persians[12] who transmitted the use of iron at the end of the 6th century B.C. to northern India, and the ironworks of the megaliths of south India are in turn to be traced to the north Indian sources. This oversimplifies the picture but runs counter to the evidence on hand and the points at issue remain unresolved. The testimony of iron in the megaliths is large and undisputed though the source of inspiration of the megalithic concept as of the iron in it and, of course, their chronological position remain precisely the points at

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issue, and already there are indications of a much earlier date for the introduction of megaliths in south India than has so far been conceded.

The repertoire of iron objects (see table 2) found in the megaliths displays a wide variety, and comprise knives, often tanged, daggers, usually tanged, wedge-shaped blades, barbed arrow-heads, spears or lances with flat elongated blades and round shafts, constricted at the butt and ending in a terminal knob, or leaf-shaped with a socket base, javelins, axes with a detached ring round the butt, featureless bars, swords with double edges and midrib, often with a hilt, adzes, sickles, hooks, horse-bits, chisels, ferrules, hatchets with a single or double diagonal straps, bangles, nails, frying pans, ladles with a long handle, and tripods to support vessels.

These objects meet the needs of warfare as well as of the household or agriculture and suggest a uniformity of cultural life over the extensive peninsular expanse of south India. It is also to be noted that Adichanallur in District Tirunelveli in the far south represented the largest variety of objects indicating an evolutional culmination with a north-to-south trend.

C. Iron in the Post-Chalcolithic and Pre-N.B.P. Ware Levels in West-Central India

(i) *Nagda*

The occurrence of iron objects (fig. 1 and table 3) in Period II (dated by the author to *circa* 750-500 B.C.) at Nagda, in District Ujjain, Madhya Pradesh, in a context which is a continuation of the earlier chalcolithic life on the site is another new evidence on an early date of the use of iron in west-central India.[13] These comprise fifty-nine objects of iron occurring throughout the concerned deposits, 6 ft. 9 in. (210 cm.) in thickness. The objects consist of a dagger with double edges and tapering point, a circular socket of a broken axe, a spoon, a celt with a broad cutting edge, a ring, a nail, arrow-heads with biconical cross-section and tang respectively, spear-heads with square or oval cross-section and knife-blades displaying a wide variety of shape and suggesting diverse uses, blades and sickles, besides, of course, seemingly, a fairly established tradition of ironworks.

(ii) *Prakash*

This inference is supported further by the evidence of well-defined objects of iron at Prakash[14], District E. Khandsh, Maharashtra, below the N.B.P. Ware levels up to a depth of

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10. D. H. Gordon, The Early use of Metals in India and Pakistan, *J.R.A.I.*, vol. LXXX, 1950, p. 67.

11. *Ibid.*, p. 63.

12. Wheeler, *op. cit.*, pp. 24 and 164. To quote Wheeler's words, "Persia transmitted, directly or indirectly, not merely a pattern of empire but also important new schemes and utilities, above all the use of iron and of coinage .... that in northern India (as indeed in distant Britain) 500 B.C. or a little earlier marks the nominal beginning of the Iron Age, always with the proviso that cultural backwaters are a familiar feature of the Indian landscape .... Following the arrival of iron—perhaps, indeed reflecting the new and fashionable metal the Ganges craftsmen invented a distinctive and remarkable ceramic which is a godsend to the archaeologist; the so-called Northern Black Polished or N.B.P. Ware of steel like quality...". He goes on to state further (*op. cit.*, p. 164), "There is in fact no more difficulty in deriving the early ironwork of south India in the 4th and 3rd centuries B.C. from Gangetic sources in the 5th and 4th centuries B.C. and ultimately from Persian sources at the end of the 6th century B.C. (p. 24) than in deriving the ironwork and N.B.P. Ware of the towns of Upper Deccan".

In this context it will be worthwhile examining the question of the Persian (Achaemenid) influence on Indian life, in particular, in the background of the history of the Persian rule in India.

The Persians held sway over the north-western parts of the Indo-Pakistan subcontinent for well-nigh two hundred years and would naturally be expected to have left their impress on the way of life in this new land effectively enough. Gandhara, identified with the modern Rawalpindi and Peshawar Districts of Pakistan (D. C. Sircar, *Select Inscriptions*, 1942, p. 5, note) is included in the list of the countries constituting the empire of Darius, the Achaemenian emperor of Persia, who ruled between 522 and 486 B.C., mentioned in the Behistun Rock Inscription of Darius (Sircar, *op. cit.*, pp. 4 and 6). But *Sindhu*, in the Old Persian form of *Hindush*, is mentioned for the first time in the Persepolis Inscription of Darius (Sircar, *op. cit.*, pp. 7 and 8). Thus the two areas, distinguished as Gandhara and Sindhu, respectively, were parts of the Persian empire from the time of Darius.

Herodotus (III, 94) says that 'India' was the twentieth satrapy in the realm of Darius from where a tribute of 360 talents of gold dust was claimed by the Imperial treasury, and it amounted to one-third of the total tax levied upon the Asiatic provinces. The Persian connexion with India can be said to have snapped about 330 B.C., when the last of the Achaemenians was defeated by Alexander. Very little indeed is known of the extent of the Persian influence upon India. Archaeologically not much can be adduced by way of comparable material remains in proof. The coin types, Daric, issued by Darius, and Sigloi appear indeed to have exercised some influence on early coinage in India, but it is quite natural that they should have done so at almost the dawn of coinage in India, though it has now been established that India evolved her own independent coinage. It was, however, D. B. Spooner (*J.R.A.S.*, 1915, pp. 63-89, 405-455), who made exaggerated claims for the Persian influence on India. But his arguments have been met by V. A. Smith (*J.R.A.S.*, 1915, pp. 800-802), A. B. Keith (*J.R.A.S.*, 1916, pp. 138-143), Thomas (*J.R.A.S.*, 1916, pp. 362-366) and Nimrod (*The Modern Review*, Cal., 1916, pp. 372-76, 490-498, 597-600).

In this context Wheeler's attribution of iron in India to the Persian source cannot be sustained in the light of the archaeological evidence coming up in the recent years. It cannot, however, be denied that the relationship between India and Iran remained close and intimate almost throughout.

As N. R. Ray (*Maurya and Sunga Art*, 1945, pp. 12 ff.) has put it, "there is more or less definite evidence of intimate cultural contact of India with Iran in

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particular from about the eighth and seventh centuries B.C. The North West and the Indus Valley forming a part of the empire of Darius made contacts with Iran earlier still. The intimate contact must have been responsible for certain elements in Buddhist and later Brahmanical mythology, tradition, worship and iconography, especially, those connected with the cults of the Sun and the Fire. It was also responsible for the origin and evolution of the Kharoshthi script, in about the fifth or fourth centuries B.C. . . . ." "In matters of art the Archaemenid joined with the other elements of the Ancient East to form a synthesised common heritage."

13. Excavated by the author in 1955-56; *A.I.*, 1955-56, p. 12; Wheeler, *op. cit.*, pp. 139, 146. The report of the exacavations at Nagda, which gives a full description of the material, is awaiting publication with the Archaelogical Survey of India.
14. *I.A.*, 1954-55; p. 13.
15. Wheeler, *op. cit.*, p. 146.
16. *I.A.*, 1960-61, pp. 17-18.
17. Aurel Stein, *M.A.S.I.*, nos. 37 and 43.
18. *Ibid.*, 37, pp. 46-47.
19. *Ibid.*, no. 43, p. 75.
20. *Ibid.*, pp. 79 and 81.
21. *Ibid.*, p. 86.
22. *Ibid.*, p. 88.
23. *Ibid.*, no. 37, p. 47, pl. XII, Miii.

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CHAPTER 3

CHRONOLOGY AND THE SOURCES OF DIFFERENT CULTURAL LANDMARKS ASSOCIATED WITH IRON IN THEIR BEARING ON THE EVOLUTION OF IRON IN INDIA

A. General

A connected study of the advent of the Iron Age in India and its progress in space and time cannot lose sight of the possible and plausible interconnexions among the widely distributed evidences described in the previous chapter. The task on hand is to interrelate the diverse testimony and examine their proposed chronological assessments in order to work out a workable sequence in the evolution of iron in India. Simultaneously it will also be endeavoured to trace the source of inspiration of the tremendous technological outburst that iron should have ushered in and also to lay bare, if possible, the identity and source of the concerned folk responsible for the introduction of iron and its propagation and development in India.

B. The Painted Grey Ware

One of the most significant and epoch-making discoveries in recent years was that of the Painted Grey Ware ceramic. It had, of course, been found earlier at Ahichchhatra in the excavations of 1940-44. Since the publication of the report on the excavations at Hastinapura, to which was appended a list of Painted Grey Ware sites known till then, the extent of the distribution of this ware has gone on growing larger with every year's exploration. The present distributional zone covers a wide area, reaching as far south as Ujjain in Madhya Pradesh (fig. 18).

Since both Kausambi and Ujjain are also associated with the Painted Grey Ware, the chronology of the early settlements on the sites are interlinked, and will, therefore, be treated together, being mutually interdependent and complementary.

(i) *Hastinapura*

In assessing the chronology of the different occupational-

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cum-cultural periods at early Indian settlements, the N. B. P. Ware serves almost as a sheet-anchor, with reference to which the bulk of the chronological assessments of recent years have been arrived at. The N. B. P. Ware deposits at Kausambi[1] were topped by coins of the Mitra dynasty, assignable to the 2nd century B.C. The N. B. P. Ware had, therefore, come to an end at the site in the beginning of the 2nd century B.C. The average deposit of the N.B.P. Ware-bearing layers at Kausambi being about 8 ft. (±244 cm.) thick with eight occupational phases, could be reasonably assigned to the beginning of the 6th century B.C. The evidence at Taxila[2] also points to a similar conclusion, where the N.B.P. sherds have been seen to occur up to a depth of 7 ft. (±213 cm.) below the levels of the coins of Alexander in mint condition. This evidence was employed by Lal[3] to fix the chronology of Period III (or N.B.P. Ware associated levels), which was represented by a maximum deposit of about 9 ft. (±274 cm.) thickness at Hastinapura, with six occupational periods, to a span of three hundred years between the beginning of the 6th and the beginning of the 2nd centuries B.C., i.e., *circa* 600-200 B.C. It may be remembered in the context that the N.B.P. Ware was at home in the Ganga plain, and Hastinapura was well within the focus. The preceding period, characterized by the Painted Grey Ware was represented by a deposit of 6-7 ft. (±183—213 cm.) thickness and was separated from the succeeding N.B.P. Ware period by a time-lag, during which there was apparently no occupation at the site, the pre-existing township having been washed away by a heavy flood from the neighbouring Ganga. Since the succeeding N.B.P. Ware cultural assemblage marked a radical change consisting of burnt brick houses, in the place of those of sun-dried bricks, coinage, and larger use of iron, Lal postulates a time-lag of two hundred years. This takes the terminal date of the Painted Grey Ware Period (II) to *circa* 800 B.C. The occupational deposit of this period was 7 ft. (±213 cm.) thick and for this a duration of three hundred years, shifting the initial date of the occupation to *circa* 1100 B.C., is considered by Lal as a conservative estimate. At this stage the terminal date for the earliest Period (I) of occupation at Hastinapura, characterized by a non-descript rolled 'Ochre Coloured Ware' contained in a brownish clay 1-1½ft. (±30-46 cm.) in thickness, overlying the virgin soil, fixed by the excavator at *circa* 1200 B.C. or a little earlier, may be recalled. Its initial date is left indeterminate. This evidence will come up again for consideration at a later stage.

Further, in consideration of the distributional limits of the Painted Grey Ware and its stratigraphical position, Lal made

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certain important inferential observations.[4] These may be summarized as follows:—

(i) The Painted Grey Ware is post-Harappan in stratigraphy and, therefore, in chronology. This is proved by the excavation at Rupar[5] and by the exploration in Bikaner.[6]

(ii) The chronological range of the Painted Grey Ware is, therefore, broadly and generally between *circa* 1500 B.C., the presently accepted terminal date of the Harappa culture, and *circa* 600 B.C., the proposed initial date of the N. B. P. Ware.

(iii) Since the Painted Grey Ware occurs in a post-Harappan context in Bikaner, the very region comprising the valley of the Sarasvati or the modern Ghaggar, which is known as the early habitat of the Aryans in India, and since they are also found in a number of sites in the Ganga plain, which are associated with the Aryan tribes, it may be postulated that the Painted Grey Ware was possibly associated with the Aryan speaking people. In this context it may be shown that the *Purāṇic* tradition of Hastinapura being abandoned in favour of Kausambi after the former city had been washed away by a flood during the reign of Nichakshu is indicated to have had some basis in historical fact, considering the paucity of the Painted Grey Ware sherds at Kausambi and the comparative simplicity of the painted design, confining itself to a rim band, as was characteristic of the later phases of this ware at Hastinapura itself when it was already on the decline.

While the question of the proposed equation of the Painted Grey Ware users with the Aryan speakers will be examined in detail later, in proper context, the chronology of Ujjain and Kausambi may now be considered against the chronological background elaborated and postulated above.

(ii) *Ujjain*

(a) *Archaeological Evidence.*[7]—The excavations at Ujjain have shown broadly four Periods of occupation. They are respectively called Periods I—IV, in chronological sequence. Period I has been dated by the author to *circa* 750-500 B.C. and Period II to *circa* 500-200 B.C. The remaining two Periods of occupation are not relevant to the problem in hand.

Period I is characterized, among others, by the black-and-red ware pottery, a distinctive granulated ware, designated as the Vesiculated Ware, a sturdy double-slipped ware, a mat-impressed red ware, and an unslipped red ware represented by the typical internally beaded bowl. The black-and-red ware has a wide range of distribution, both in space and time, and would not by itself be a safe criterion for chronological conclusions.

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The double-slipped ware may perhaps alternatively be called as a black-washed, -slipped or -painted red ware. It is fine in texture and has a smooth and thin fabric with just a superficial feel of raised lines of striations on the exterior surface. Dishes with sagger base and inwardly tapering tall sides and bowls with internally inclined cordoned rims are the two typical shapes available in this ware. The dish in the same ware has been found previously at Ahichchhatra in association with the Painted Grey Ware, and also at Kausambi with the unpainted plain grey ware. On this analogy, a chronological equation with the corresponding levels of Kausambi may be postulated.

The mat-impressed ware occurs at Hastinapura in the upper levels of Period II (*circa* 1100—800 B.C.).

Similitude in cultural wherewithal, one of the most important components of which is pottery, can perhaps be employed to infer a tentative chronological equation, allowing a time-lag for dispersal from the obviously earlier centres of settlement. The mud-houses of Period I at Ujjain present yet another parallelism with Period II of Hastinapura, which, however, cannot be pressed too much, but can, nevertheless, be maintained. On this basis, the earliest Period (I) of habitation at Ujjain is dated, tentatively, to *circa* 750 B.C. It seems to be corroborated by about 7 ft. (±213 cm.) thick strata representing the deposits of this period in as many as ten layers.

The next succeeding Period (II) of life at Ujjain is characterized, among others, by the well-known N. B. P. Ware in a wide variety of shapes and forms including local imitations. The inclusive dating of *circa* 600-200 B.C. attributed to this pottery and the associated cultural milieu by Lal has been discussed above. Taking the Ganga valley as the mature home of the related cultural complex, and allowing approximately a hundred years at the outside for its dispersal to peripheral regions, including Ujjain, the dating suggested for Period II at Ujjain, distinguished by the N. B. P. Ware was easily set down to *circa* 500-200 B.C.[8]

The excavations have also revealed that the ancient township of Ujjain was protected from almost the beginning of its life by a massive mud-fortification covering an area measuring 1 × ¾ miles (± 1.6 × 1.2 km.). On the basis of extant remains, the fortifications were 250 ft. (± 76.5 m.) broad at the base and about 45 ft. (± 14 m.) high. It was further reinforced by a 152 ft. ±46 m.) wide moat on the south and east and by the river Sipra on the west and distantly on the north. The flank or toe of the fortifications, which sloped away both exteriorly and interiorly on either side of the axial apex, was further reinforced on the

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water-front, that is on the west, by the placement of well-cut wooden sleepers or beams in a connected manner for a stretch of nearly 350 ft. (±91 m.) alongside the river, corresponding in length to an inward bend in the stream (pl. IV). This feature was observed along the northern half of the western face of the ramparts. The sleepers were placed angularly to the flow of the river so as to serve as a buffer to break the force of the striking waters. These served, therefore, as the first line of defence against the frequent floods of the adjoining stream which is alternatively also called the *Kshiprā*, or the speedy one. The sleepers are laid, as seen in the trench sunk, carefully in several courses to form a series of deep, rectangular chambers, intended apparently to hold the dumped clay in position and prevent it from being scoured away. It may be added in fairness that in order to save the defences from the frequent onslaught of rising waters, the width of the fortification was first extended on the west or river side to 350 ft. (±170 m.) before lining it with the wooden reinforcements. At other places brick-revetments or platforms were erected to save the fortifications from destruction. The wooden reinforcements belong to a late phase of Period I.

The fortification was built of hard yellow clay and black cotton clay, respectively, heaped up in the manner of building up a bund. The black clay was clearly dug up from the surrounding regions, from the 5-7 ft. (±152-213 cm.) thick mantle of virgin black cotton soil overlying hard yellow clay.

Both these clays are very compact and extremely hard, and even modern pickmen armed with iron pickaxes find it extremely difficult to cut through them.[9] The fort builders used these very clays, and must, apparently, have employed a hard metal for the purpose. No remains of copper or bronze objects, either in size or strength, have been found that could have answered the requirement. In view of modern experience, the metal employed for the work must presumably have been of iron. Incidentally a fairly well-preserved blade of an iron spade, and some indeterminate objects of iron, suggesting, by their length, crowbars, under advanced disintegration, have been found in the body of the rampart. The occurrence of well-defined iron objects in the deposits of Period I has already been mentioned. These tend to prove that the construction of the defences presupposed a fairly extensive use of iron.

The wooden sleepers or beams referred to above, employed in the reinforcement of the defences, were found to be extremely hard and are even now in a good state of preservation. They vary in length approximately from 13 to 18 ft. (±396-549 cm.) and

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are neatly cut and have straight and smooth sides with a 9 in. (±23 cm.) square cross-section. Apart from the felling of the trees, even the skilful cutting of hard wood suggests and implies the use of some hard metal such as iron, besides a fairly long probation in the art of wood cutting, giving iron a still earlier date of origin in this part of the country. The smooth surfaces of the logs further suggest the employment of a saw. The beams or logs account for two varieties of wood, namely, Teak (*Tectona grandis*) and Safed Khair (*Acacia ferruginea*) both of which are examples of hard and strong timber. On this matter one can do no better than quote from the report of the late S. S. Ghosh[10] of the Forest Research Institute, Dehra Dun, who had finished preparing the report of these wooden remains from Ujjain shortly before his sudden death in 1961: "Besides the identity and technological aspects of these timbers, the most remarkable point that has emerged from this study is the possible manner of fabrication of such large-sized beams during a period when much technological advancement had not taken place. At present such large-sized beams are cut in a saw mill with the help of high class and efficient steel saws of various types. In the absence of such mechanical devices in ancient times, the fabrication must have been done by some sharp axe-like hand implement. This becomes quite clear when both the end and longitudinal surfaces of the beams are examined. Firstly, the trees must have been felled with this hacking tool and then cut into required lengths. In the case of teak (*Tectona grandis*), the entire logs have been trimmed into 9″ × 9″ (±23 × 23 cm.) square beams. In the case of Son Khair or Safed Khair (*Acacia ferruginea*), the log has been first divided into two portions longitudinally from the middle and then again hacked into 9″ × 9″ (±23 × 23 cm.) square beams. The way this timber has been hewn shows clearly that the hacking tool must have been made of some metal, probably iron. The possibility that such a hard, heavy, dense and strong timber like *Acacia ferruginea* could have been cut and shaped without the use of a heavy axe-like implement made of *iron* is indeed very remote, for other metals or alloys like copper or bronze could hardly have served the purpose satisfactorily. A perusal of the high-strength properties of the Ujjain timber (Son Khair or Safed Khair *vis-a-vis Acacia ferruginea* and other allied species of *Acacia*) furnish further support to this view. A check of the cuts noticed on the beams indicates that the length of the cutting edge of such an axe must have been about 9.5 cm. (3.08 in.) or so. The tool must have been also very sharp as indicated by the rather longitudinally cut surfaces of the beams."

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Thus this evidence points to the use of iron during the earliest phases of the fortification around Ujjain, i.e., in Period I, *circa* 750-500 B.C. This inference is strengthened by the discovery of the remains of an apsidal structure, built of columnar dressed stones (pl. V), belonging to the earliest levels of Period II (*circa* 500-200 B.C.). The use of dressed stones at so early an age is a striking phenomenon. The dressing can easily be set down to the use of iron implements, themselves the result of a reasonably long experience, obviously rooted in Period I.

It would not be out of place to mention here in passing that the fortification served merely as a citadel where possibly the rulers and the soldiery, besides the tribesmen who were required to supply the sinews of war, were allowed to live. Considerable areas of habitation lying outside the fortifications point to this inference.

Stratigraphically the deposits of Period I overlie the mud ramparts. As the body of the rampart also contains some quantities of materials of Period I, a time-lag between the earliest settlement in the region by the people of Period I and the growth of the habitations into sufficient importance to justify the construction of a fortification must, therefore, be conceded. The traces of habitations outside the fortifications point to the earlier settlement in the area.

It would, therefore, be a fair assumption or concession to allow a period of twenty-five to fifty years as the time-lag between the first settlement at the site and the raising of the defences. The iron objects found in the lowest levels of Period I, outside the fortifications, might possibly belong to the earliest part of the period, *circa* 750-500 B.C., and even before the defences came into being.

(b) *Literary and Epigraphical Evidence on the History of Ujjain Bearing on its Chronology.*—It will not be out of place to consider the literary and epigraphical evidence in respect of the ancient history of Ujjain as the archaeological evidence tends to confirm the former in some respects. The first separate Rock Edict of Asoka[11] mentions Ujjayinī (Ujjeni). Ujjain in his days was the headquarters of a southern viceroyalty. The *Periplus of the Erythraean Sea*[12] also mentions the name as Ozene, which is a Greek version of the contemporary form of the name of Ujjain. Anciently, however, it was possibly named *Avanti* and the same name occurs also in some later inscriptions. The Nasik[13] inscription of the Andhra king, Vāśishṭhiputra Puḷumayi and the Junagadh Rock inscription[14] of the Saka ruler, Rudradāman, mentions Avanti along with 'Ākara' among the names of territories in their domains. The identification of

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'Ākarāvanti' has been the subject of a controversy. Vāśishṭhiputra Puḷumāyi's inscription mentions simply 'Ākarāvanti', while Rudradāman's Junagadh inscription mentions '*Pūrvāparākarāvanti*'.

On the basis of the description of Māhishmatī as the capital of the Avantis in the Pali *Mahāgovinda Suttānta,* D. R. Bhandarkar was inclined to think that there were two Avantis, namely, the northern with Ujjain as its capital, and the southern with Māhishmatī identified with Maheshwar[15] on the northern bank of the Narmadā in District Nimar, Madhya Pradesh, as its capital. Malalasekhara[16] is, however, of the view that after Māhishmatī lost its importance Ujjayinī became the capital of Avanti. Raychaudhuri has, however, translated '*Pūrvāparākanāvanti,* as Eastern and Western Malwa respectively.[17]

This leaves out of account the appelation 'Ākara'[18] added to Avanti. *Ākara* in Sanskrit means a mine or quarry. It is well known from the *Periplus* that Ozene or Ujjain was a source of export of agate and carnelian stones[19] among other articles. Agate and carnelian are available to this day in the veins of the trap bedrock in the bed of the Śiprā. The recent excavations too have revealed large-scale workings on agate, jasper and carnelian for the manufacture of beads[20] in the period after *circa* 200 B.C., the raw material being amply available locally. The stone quarries of Ujjain in the days of the writer of the *Periplus* must have been well known enough to have merited the description of Ujjain as a source of agate and carnelian in it.

The excavations have also shown the existence of extensive manufacture of iron objects at Ujjain involving smelting and forging in Period II, dated to *circa* 500-200 B.C. This task would have been rendered easier and all the more possible if the raw materials were locally available. Iron ore[21] in the form of mammiliated limonite is indeed available in the hollows of trap in the region. Calcite or aragonite, a form of lime-stone or calcium carbonate, appears also at Ujjain along with slags amidst the stratified objects as flux for smelting. Calcium or aragonite too is available locally,[22] and a little over 20 lbs. of calcite has been found in a limited area of the excavation. Lumps of calcite or aragonite crystals occur sporadically in the occupational deposits as well as on the surface at the site. The presence of slag amid the iron workings alongside the lumps of calcite or aragonite shows their obvious interconnexion. The use of calcite or aragonite[23] as flux in the smelting of iron ore could only have emerged at an advanced stage of the industry. One of the main difficulties in the extraction of iron from iron ore is the gangue of iron ore. The gangue is siliceous and combines in the furnace

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with a part of the ferrous oxide of the ore and forms into slag. The slag, however, is not easily separable from the metal, and in the early stages of the metallurgy of iron repeated heating and hammering was necessary to eliminate the slag from the metal, involving considerable waste or loss of the metal imprisoned in the slag, besides also of time and fuel. The use of lime as a flux to make the slag more fusible and thus separable from the metal was slowly achieved after much trial and error. Lime is added even in modern undertakings as a flux; nevertheless, it is considered that lime was used, if not in the very early days of iron metallurgy, fairly early in the evolution of iron technology.[24] This would presuppose a considerable background for the iron industry at Ujjain, the beginning of which would recede to much earlier times than the commencement of Period II at Ujjain, even if the well-defined conventional objects of Period I are not attributed to a local industry. Even so the occurrence of conventional objects at the very commencement of Period I at Ujjain would presuppose the beginnings of the iron industry and technology in India, at a still earlier date, wherever it may have lain. This evidence has an indirect bearing on the chronology of the periods concerned as well of the technology of iron in India.

Thus Ujjain has been shown by archaeology to have indeed been rich anciently in minerals. It is not, therefore, to be wondered at if the ancients should have really named it '*Ākarāvanti*', in recognition of its being endowed with mines and quarries. '*Ākara*'[25] has been identified also with the little township of Āgar, situated 40 miles (64 km.) to the north-east of Ujjain. Incidentally, Āgar is reported to have some ores of iron.[26] The occurrence of mounds in its neighbourhood points, in all likelihood, to the ancient habitations in the area. Āgar may, therefore, be a phonetic transformation of Ākara, and in this identification may be the proper clue to the nomenclature of *Ākarāvanti*.

To steer clear of the divergence of literary accounts as of interpretations it may be stated that the country of Avanti corresponded to the Ujjain region. While the early history of the region is clothed in obscurity, the *Purāṇas* aver that the two sons of Yadu, claiming descent from Manu Vaivasvat, divided up between themselves the land bounded by the Charmanvatī[27] (Chambal), Vetravatī[28] (Betwa), Suktimatī[29] (Ken) and the Narmadā. The southern division went to the Haihayas,[30] and the northern region was taken by the Yādavas[31] The *Purāṇas* describe the first dynasty ruling at Māhishmatī as the Haihayas. Originally their capital may have been located at Māhishmatī (Maheshwar), and on its decline the capital may have shifted

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to Ujjain (Ujjayinī). The Haihayas had established themselves in the region by overthrowing the aboriginal Karkoṭaka Nāgas.[32]

The *Matsya Purāṇa*[33] states that the Haihayas were divided into five branches, namely, Vītihotras, Bhojas, Avantis; Tuṇḍikeras or Kuṇḍikeras and Tālajaṅghās. When the Vītihotras and Avantis declined, an *amātya* (minister or governor), called Pulika or Punika, killed his master and set up his own son, Pradyota[34] on the throne of Avanti.

At the unfolding of the so-called historical period in India, north India was divided into sixteen Mahājanpadas or kingdoms. Of these the kingdoms of Avanti, Vatsa, Kosala and Magadha with their capitals at Ujjayinī (Ujjain), Kausambi, Sravasti (Saheth Maheth), in District Baharaich, and Rājagriha (Rajgir), in District Patna (Bihar), respectively were the most important.

At the time of the Buddha, the throne of Avanti was occupied by Chaṇḍa Pradyota Mahāsena,[35] who is no other than the Pradyota who replaced the Haihayas. The *Mahāvagga* calls him '*Chaṇḍa*',[36] meaning fierce, and the *Purāṇas* describe him as '*Nayavarjita*'[37] or devoid of principles. Pradyota was naturally a contemporary of Bimbisāra[38] of Magadha and made war with him, but the hostilities were terminated by a treaty of friendship.

Later, when Pradyota was once stricken with jaundice he requested his ally, Bimbisāra, to send a physician to his court. Bimbisāra accordingly sent the physician, Jīvaka[39] to Ujjain. Jīvaka, apart from being a capable physician,[40] was a shrewd judge of men and matters. Knowing that his royal patient was of uncontrollable and unforeseeable temper, he first obtained from him permission to enter into or leave his kingdom (or capital) at any time and also a quick animal, namely, an elephant for his exclusive use for rapid transport to enable him to gather the ingredients (roots and herbs etc.) of the required medicament. As he knew his medicine to be unpalatable he was not sure of its effect on the king's mercurial temper, and he, therefore, took this precautionary step to secure his escape from the king's wrath in advance in the event of the wind blowing against him.

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His seeking permission to enter into and leave the capital could have meaning only if the capital city was walled or fortified. On this assumption, the fortification at Ujjain must have been in existence at the time of his visit, that is during the reign of Pradyota.[41]

Pradyota also made king Udayana of Vatsa,[42] which was evidently a contiguous kingdom, his captive by a stratagem recalling the Wooden Horse of Troy. Recent archaeological discoveries at Kausambi, the fortified capital city of Vatsa, have lent support

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to the historicity of Udayana. These evidences will be examined in detail in proper context while dealing with the chronology of Kausambi.

Pradyota waged an unsuccessful war against king Pukkusāti[43] (Pukkusārin) of Gandhara (Taxila). This must have taken place prior to *circa* 521 B.C. as, by that date these areas in the north-west part of India, comprising Gandhara, were conquered[44] by the Persians under Darius, and made into one of the Satrapies under the Persian empire which continued until the time of Alexander. Both Pukkusāti and Pradyota must, therefore be dated prior to the Persian conquest.

Pradyota was also feared by Bimbisāra's son and successor, Ajātaśatru, because the former planned an attack on the latter for having murdered Bimbisāra. To safeguard himself against the threatened attack by Pradyota, Ajātaśatru strengthened the fortifications of Rājagriha.[45]

Recent archaeological excavations have exposed remains of ancient fortifications at Kausambi, Sravasti, Rajghat and elsewhere thus confirming the tradition of fortified cities. A king, who was ambitious and who waged so many wars against his neighbours as well as distant kingdoms, as Pradyota did, could not have left his own capital undefended. The defences of Ujjain must, therefore, have existed in completed form before at least the armed compaigns of Pradyota.

His title or epithet of *Chaṇḍa* cannot be without significance. The early warlike exploits of Pradyota could not have been inspired except by a sense of security emanating from the possession of a superior fighting equipment, besides, of course, his unruly nature nurtured by ambition. That he was a redoubtable fighter is suggested by the epithet, *Mahāsena*. Can it be suggested that he owed his strength to steel weapons? It is not unlikely, though the point cannot be pressed in view of inadequate data on the degrees of differential carburization or steeling of iron objects of antiquity. It is not likely, however, that Bimbisāra or Ajātaśatru did not possess any equipments of iron, especially in the face of the positive evidence from Hastinapura, Kausambi and Alamgirpur. Nevertheless, Pradyota's repeated trials of strength against formidable enemies cannot easily be explained except by attributing it to a superior weapon. A newly discovered object is likely to be more frequently used than justified, by its owner, like a new possession, say the catapult in the hands of a child. The indiscriminate use of his weapons of steel may have resulted in endless and meaningless slaughter and earned for him the titles of *Chaṇḍa* and *Nayavarjita* respectively. The possession of a newly found superior weapon may have given him success

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in comparatively minor engagements with his less powerful adversaries. His record of armed conflicts shows him as a defeated general both against Bimbisāra, his illustrious Magadhan contemporary, who had enlarged his kingdom and laid the foundation for its hegemony in the whole of India, which it enjoyed under his son and successor, Ajātaśatru, as well as the less known Pukkusāti of Taxila. The ruse he employed to capture his rival from Kausambi was not the open manner of a noble warrior. Notwithstanding these facts, Pradyota is designated as a *Mahāsena* or great warrior. A powerful man, even in discomfiture may, therefore, be called great because perhaps of prowess as well as such extraneous factors as efficient organization of the army and fighting equipments. Such success may have emboldened him to try conclusions with the powerful northern kingdoms. Though unsuccessful in the wars he concluded peace treaties with his matched adversaries. If it is conceded that Pradyota had steel weapons, it is inevitable to presume that his adversaries were possessed of an equipment that was no less efficient. It would only imply that iron had become widespread in India at that date.

The literary evidence on Pradyota is mostly derived from the accounts in the *Purāṇas* and Buddhist literature. According to the Buddhist sources, Pradyota, called Pajjota in Pali, is said to have been born on the same day as the Buddha.[46] He ascended the throne at the time of the Buddha's Enlightenment, i.e., in the thirty-fifth year of both i.e. in (563-35=) 528 B.C. *Majjhima Nikāya* (iii, p. 7) shows that Pradyota was alive even after the death of king Bimbisāra of Magadha, who died eight years before the demise of the Buddha. Some manuscripts of the *Matsya Purāṇa*[47] give fifty-two years as the total duration of the reign of the five Pradyotas. This may actually refer to the reign of Pradyota himself, in the light of the evidence of the Buddhist accounts, in which case he may have survived the Buddha by about seven years like Udayana.[48]

The other *Purāṇas* relate that he ruled for twenty-three years. This short duration would put his death at (528—23=) 505 B.C. relying on the Buddhist evidence for the date of his birth. This would imply that he was dead long before Bimbisāra, and this is at variance with the Buddhist accounts of his threatening an invasion of Magadha on the accession of Ajātaśatru. Pradyota felt outraged at the murder of his friend and fellow-monarch, Bimbisāra, by the latter's son, who in the face of the threatened attack repaired and reinforced, as stated above, the fortifications at Rajgir. If these facts were true, Pradyota's death should have taken place after the death of Bimbisāra, and counting a reign of 52 years it should have come about in (528—52=) 476 B.C.

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The dating of Pradyota, arrived at on the basis of literary evidence, the central factor of which is his contemporaneity with the Buddha, fits in suitably with the archaeological evidence of the existence of the defences at Ujjain much before 500 B.C. His contemporaneity with Udayana, high-lighted by several literary works, is further sought to be proved archaeologically by the possible remains of the latter's palace and well-known monastery of Ghoshitārāma, built during his reign and hallowed by the sojourn in it by the Buddha himself, as described below. His contemporaneity with the Buddha, Bimbisāra and Ajātaśatru (also Jīvaka) has been indicated above.

The recent small-scale excavations at Rajgir[49] have shown the earliest settlements on the site as prior to the introduction of the N.B.P. Ware and associated cultural assemblage. The earlier settlements are indicated by the rare occurrence of shapeless sherds of a ware, not presently definable, being 'rolled' by water action, though sherds of a coarse to medium-red ware may represent this phase of existence. The N.B.P. Ware and associated stratigraphical level would, therefore, be contemporaneous with the period of the Buddha and this interconnexion would plead for a support to Lal's revision of the initial dating of *circa* 600 B.C. for the N.B.P. Ware at such a westerly site as Hastinapura among the Aryan settlements. It may be emphasized here that Rajgir has yielded a rich ensemble of this ware. It is also to be noted that traditional history takes the antiquity of Rajgir to the period of the *Mahābhārata*,[50] with the founding of the Bārhadratha dynasty by Brihadratha of the Kuru family at Girivraja (Rajgir) as the capital. His son and successor, Jarāsandha, was a contemporary of the Pāṇḍavas.

The literary tradition and the archaeological evidence thus combine to show a comparatively late settlement of the Aryan tribes at Rajgir, in the fitness of things, in the course of their gradual expansion in the Ganga plain towards the east. This evidence at once pleads for an earlier date of the N.B.P. Ware at Hastinapura and, correspondingly, a still earlier date for the preceding Painted Grey Ware culture, lending support to Lal's chronological conclusions in regard to them, as also connectedly to the scheme of dates for the first two Periods at Ujjain.

(c) *Conclusion.*—Since the date-scheme arrived at purely with the help of literary evidence seems to accord with the chronological conclusions on archaeological grounds, one feels emboldened to conclude that the literary evidence is not altogether useless as a source of historical and even chronological data. If these dates are acceptable archaeologically the earliest occur-

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rence of iron at Ujjain can be set down, accordingly, to a period before Pradyota.

Lal's excavations have brought out that Period III (associated with the N.B.P. Ware) at Hastinapura was marked by a richer environmental and cultural repertoire than the previous periods. It was a characteristic shared commonly by the Ganga-Jamuna sites at this time. Similar prosperity is also reflected in the corresponding Period (II) at Ujjain. Not a little of it should be attributed to the close contacts established by Pradyota with the Ganga plain a little after the beginning of this time. Inherently, it suggests a time-lag between the first emergence of this cultural milieu and its importation to distant Ujjain from the focal point, and points to the correctness of Lal's tentative dating.

In this context the date for the commencement of Period II at Ujjain would seem to recede, strictly speaking, under the circumstances, by a necessary revision to *circa* 528 B.C., at the earliest, historically, though for cultural purposes the proposed initial date of *circa* 500 B.C. is not perhaps too late.

The consideration of the political history of north India after Ajātaśatru, pieced together on the basis of literary evidence, shows that the dynasty of Pradyota was humbled during the reign of Śiśunāga, one of the successors of Ajātaśatru, whereupon the hegemony over Ujjain passed to the rulers of Magadha. Not many years later was Asoka, the third Mauryan king, installed during his princehood, as the Viceroy of Ujjain. Between Pradyota, the founder of the Pradyota dynasty of Ujjain, and Asoka lies a gap of nearly three centuries, and this period is not politically a blank, even though literary evidence is almost the only evidence to go by, barring the archaeological remains coming up in recent times.

(iii) *Kausambi*

(a) *Archaeological Evidence: The Ghoshitārāma Monastery and the Palace.*—The recent excavation at Kausambi[51] near Allahabad, on the left bank of the Yamuna, have shown a sequence of habitation beginning with a declining phase of the Painted Grey Ware or a little earlier. The duration of the ware here is apparently shorter than at Hastinapura, being represented by 11 ft. 9 in. (±328 cm.) thick strata as contrasted with Hastinapura's 6 to 7 ft. (± 183—213 cm.). The distribution of the ware is also sparse and the ware as a whole is less fine here than at Hastinapura. The painting too is confined for the most part to a thin band along the rim, or hesitant blotches as opposed to the characteristic variegated and deliberate designs found elsewhere,

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say at Hastinapura or Rupar. These circumstances would indicate a late date for its emergence at the site. Excavations have shown that (i) the mud rampart with a burnt brick facing or revetment, which enclosed the ancient habitations, dates from the earliest Period, and (ii) the Ghoshitārāma monastery, which was used till its destruction by Hūṇa Toramāna,[52] had been built almost simultaneously with the introduction of the N.B.P. Ware following immediately after the Painted Grey Ware.

The Buddhist tradition attributes the construction of a monastery to Ghoshita,[53] one of the leading bankers of Kausambi whose, foster-daughter, Sāmāvatī, was married to the reigning king, Udayana. The discovery of the monastery in the south-eastern[54] corner of the site at Kausambi agrees with the description of Yuan Chwang[55] of its location. Archaeological evidence has shown the continued existence of the monastery from the time of its construction, in the 6th century[56] B.C., to the 6th century A.D., when it was destroyed by Hūṇa Toramāna,[57] through sixteen successive phases of structural activity, comprising repairs and extensions. Apart from the record of literary tradition, the monastery was seen and described by Fahien[58] between 399 and 414 A.D., before its destruction, when it was already in a decadent condition, and later by Yuan Chwang[59] between 629 and 644 A.D., when it had already fallen into ruins because of the destruction that took place in the interval. He was still able to see a monastery in the precincts, which he attributed to Asoka, but which, archaeologically, had come into existence during the second stage of the constructions, datable in the excavator's estimation to the 5th century B.C. Nevertheless, there are evidences for a second stage of additions to the monastery in the third phase of general constructional activities, which took place in the 3rd century B.C. These additions were, no doubt, made during the reign of Asoka, who also raised a pillar at Kausambi[60] with Edicts, which has since been removed to Allahabad.

The identification of the monastery has been conclusively settled with the help of inscriptions and seals[61] found in the premises in the course of excavation. Though these are later in point of time than the date of its erection, there can be no question about the correctness of the identification. The discovery of the Ghoshitārāma monastery is one of the most significant discoveries of the present epoch as it really sets the seal on the question of the date of the N. B. P. Ware at the site as being contemporaneous with the Buddha and Udayana and connectedly with Pradyota of Ujjain and Bimbisāra of Magadha. Literature

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records as well that Udayana was born on the same day[62] as the Buddha even as Pradyota was.

It may be recalled that the monastery was erected by one of the leading bankers of Kausambi in honour of the Buddha, whom he and two other colleagues had invited to visit Kausambi. According to the literary tradition the Buddha paid several visits to Kausambi, but his first visit took place in the 6th year of his ministry. On this calculation the Ghoshitārāma monastery should have been thrown up before [563—41 (i.e. 35+6) =] 522 B.C. It is also recorded that the Ghoshitārāma was also visited by Sāriputta, Mahākāchchāyana and Upavana. The historicity of Sāriputta[63] is indicated by the find of inscriptional references to him in the stūpa at Sanchi.

Thus it is clear that the archaeological evidence on chronology seems to receive support from the literary evidence about king Udayana ruling in the 6th-5th centuries B.C., and about the construction of the monastery during his reign.

Excavations at Kausambi during the year 1960-61 have brought to light yet another significant archaeological evidence. It is in the form of an enormous palace-complex[64] covering an area of about 75 × 75 metres. Even the fraction of the area that has so far been exposed shows the gigantic size of the palace. The northern wall which measures 130 metres, shows from its having towers at each end with return-walls on the east and west respectively, now only partially revealed, the general lay-out of the royal dwelling broadly suggesting an inner fortress or citadel within the larger defences of Kausambi.

Structurally, the palace shows three phases of construction. The earliest, built partly over a purposely raised level platform of mud and mud-bricks, was built of random rubble set in lime-mortar just prior to the appearance of the N. B. P. Ware on the site. The second phase came into being shortly after the emergence of the N. B. P. Ware, and was marked by the use of dressed stones as veneer for a rubble core. The third and last phase, following an extensive destruction of the palace, before the N. B. P. Ware had finally died out, was marked by the use of bricks for the core and dressed stones for the facings. The palace was deserted after the fall of the Mitra dynasty.

Being an imposing edifice, suggested by its size and towers, it is very likely to have been used by king Udayana, circumstantially and in keeping with the tenor of chronology, in the second or N. B. P. phase. The earlier emergence of the N. B. P. Ware than the commencement of the second phase of construction might represent a time-lag for the diffusion of the cultural milieu which had become general at this period and also to enable the

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young monarch to come into his own as a mature man of refined taste.

(b) *Literary Evidence on the History and Chronology of Kausambi in the Light of the Archaeological Evidence.*—Certain aspects[65] of the character, upbringing and circumstances of this ruler would make such an inference plausible. Though born and brought up in the hermitage of a sage in the Himalayan region, religious opinion sat very lightly upon him. He is alleged to have once aimed an arrow at the Buddha but missed. His kingdom was one of the four powerful kingdoms of the time, and it was the jealousy of Pradyota on account of Udayana's wealth and prosperity that had prompted the former to capture the latter. The mainstay of his army was the elephant corps, and he was an expert in taming the mighty beasts by his playing of the *vīṇā* (lute). That he was resourceful is indicated by the manner of his escape from captivity under Pradyota. His campaign of *digvijaya* (conquest of all directions) is mentioned by the *Kathāsaritsāgara,* and *Priyadarśikā* refers to his conquest of Kalinga. Apart from being a celebrated musician he was a man of romantic temperament and was much married. Circumstances saw him on the throne of an affluent country, and one of the leading bankers of the times, namely, Ghoshita was his father-in-law. Ghoshita, who was himself a builder of public institutions, was doubly under the sphere of influence of Udayana and could be made to loosen his purse strings in an emergency, say for the enlargement and improvements to the royal palace.

The *Purāṇic* evidence of the flood in the Ganga at Hastinapura is sought, very reasonably indeed, to be proved by Lal by the occurrence of an erosional scar, the result of an inundation, doubtless from the Ganga flowing by, removing and washing away the remains of the earlier habitation in the exposed section at Hastinapura. Archaeologically, it is inferred that the flood was so disastrous that the site remained unoccupied for some time before the next settlers moved in. The new cultural *ensemble* was so variegated and advanced as to present a complete contrast with its predecessors. Lal's postulate of a period of two hundred years as the interregnum, during which this development took place, has already been mentioned (p. 13). On this calculation, the date of 800 B.C. for the abandonment of the site at Hastinapura was arrived at by him. The *Purāṇas* describe the flood to have taken place during the reign of king Nichakshu of the Paurava line, whereupon he abandoned Hastinapura and settled at Kausambi, which henceforth became the capital of the dynasty. Nichakshu was the son of Adhisīmakṛishṇa, and

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fifth in order of descent from the Pāṇḍavas, according to the *Purāṇic* list.[66] The *Purāṇas* enumerate a list of twenty-five kings beginning with *Adhisīmakṛishṇa*. Udayana, the hero of legends and romances, the mythical king who has now become a historical figure, was the twenty-first in succession. It may be noted in passing that the *Purāṇic* genealogy, normally, enumerates merely the names of kings with their titles of valour or prowess, bringing out only the father and son succession; and the only out of the way or extra event mentioned in these stereotyped accounts is the flood in the Ganga, the consequential abandonment of Hastinapura and the new settlement at Kausambi. Is it not remarkable that no other exploit occurs in this list? It was obviously a great event to justify the specialized treatment it has received in the *Purāṇas*.

It is also to be noted that the character of the ceramics, one of the prime indices of early cultures, in a stage of decline towards the end-phase of Hastinapura II and the commencement of the corresponding phase at Kausambi is similar. This shows that where Hastinapura winds up, Kausambi commences, as if the corresponding settlement at Kausambi catches up with the dying phase at Hastinapura. This is surely no accidential coincidence between archaeology and literary account, but apparently a tangible corroboration of a fact that literature has been carrying forward.

The flood evidence at Hastinapura[67] is attributed by Lal, by implication, though provisionally, suggestively and circumstantially to the period of Nichakshu, the fifth king in the Paurava family in descent from Abhimanyu, son of Arjuna, as per genealogical lists of the *Purāṇas*. On the basis of inferential archaeological evidence it is dated by him to *circa* 800 B.C. Udayana, the twenty-first king in the same line, is seen to be on the throne of Kausambi contemporaneously with the Buddha. Though stated to be born on the same day as the Buddha, he, like his Avantian contemporary, Pradyota, survived the Buddha by about ten or fifteen years.

(c) *Conclusion.*— As the Buddha is taken to have departed in 483 or 486 B.C., *Udayana* could have lived and ruled up to a maximum of 15 years thereafter, i.e. till (486—15=) c. 471 B.C. Counting back from him till the time of Nichakshu, 21 kings in all have to be accounted for. An average of 15 years per period would bring the commencement of the reign to [471 + 315 i.e. (21 × 15)] 786 B.C., while an average of 20 years per reign would bring it to [471 + 420 or (21 × 20)] 891 B.C. As the latter would separate the end-phase of the Painted Grey Ware from the

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beginnings of N.B.P. Ware by about 300 years, the discrepancy would be rather too wide, in view especially of the recent archaeological evidence of the Painted Grey Ware being a precursor of the N. B. P. Ware with an overlap between the two cultural representatives found at Sravasti Thus an average reign-period of between fifteen and twently years respectively per reign, would bring the chronology of the commencement of the rule of Nichakshu within a reasonable measure of the date suggested on archaeological grounds. For this purpose it is reasonably presumed that the flood in the Ganga took place shortly after his accession to the throne, obliging him to shift to Kausambi almost immediately thereafter.

Pargiter has arrived at certain chronological conclusions[68] on a similar basis. The genealogies of the early dynasties are available in the different *Purāṇas,* and setting aside the anomalies of palpably tall and often divergent claims about the periods of reign of the multitudinous monarchs, a reasonably workable scheme of sequence and time can perhaps be estimated. A firm date in Indian chronology is provided by the date of Chandragupta Maurya, the Magadhan contemporary of Alexander the Great. The initial year of Chandragupta has been accordingly fixed, after Sir William Jones' famous identification of the Greek writer's Sandrakottus with Chandragupta Maurya, at 322 B.C. The *Purāṇas* give the preceding dynasty, the Nandas, a period of a hundred years, bringing the commencement of the reign of Mahāpadma Nanda to (322+100=) 422 B.C. He is described as the destroyer of all contemporary Kshatriyas[69], and can, on this evidence, be taken as the real founder of the Magadhan hegemony in ancient India as Pargiter shows. This task may have taken him 20 years to accomplish, and it is unlikely that he came to the throne before he had attained the age of 20 years. The starting point of the rule of Mahāpadma Nanda would, on this basis, be [322+(100-20)=]402, as the period of 100 years of the Nandas includes the life-span of Mahāpadma Nanda himself and of his sons and not merely the reign-period as Pargiter would interpret it.

The twenty-six kings of the Paurava line,[70] beginning with Adhisīmakṛishṇa, before the Nandas, have been assigned by Pargiter an average reign each of 18 years[71], which would show Adhisīmakṛishṇa's reign to commence about 850 B.C. Allowing 20 years on an average to the reign of each of the five preceding rulers or kings upto Yudhishṭhira, a period of hundred years would be arrived at to fill the gap between the end of the Epic War and the commencement of the reign of Adhisīmakṛishṇa. The Epic War would seem, on this showing, to have taken place about

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950 B.C. No doubt this is against the *Purāṇic* evidence that Mahāpadma Nanda flourished more than a thousand years after Parīkshita's birth.[72] But Pargiter has shown that the discrepant evidence on this point cannot be relied upon. A strict calculation of the date of the Epic War, on this basis, would take it to [(402+1050)=]1452 B.C. at the earliest. This would imply a much earlier arrival of the Aryans into India, and a corresponding time-lag for their settlement in the Ganga plains before the Epic War. This is, however, against the trend of modern chronological assessment of the Aryan immigration into India, which will be discussed at some length in Chapter 5. In view of this development, the *Purāṇic* statement, regarding the time-span between Parīkshita and Mahāpadma Nanda, divergent and discrepant as they are, need not, therefore, be taken as absolutely correct, nor taken into consideration for chronological calculations. At best the statement can be interpreted as expressive of a fairly long period of time, which, in the present estimate, has come to about 550 years.

Other scholars have fixed still earlier dates for the Epic War at higher lengths of the average reigning periods. Raychaudhuri, has pleaded for a later dating in the 9th century B.C.,[73] on the basis of a smaller average regime per ruler. One need not, and cannot, indeed be categorical about these dates in the absence of concrete evidence and a date anywhere between 950 B.C. and 850 B.C. would be reasonable as demonstrated by Lal.[74]

On the calculation of Pargiter,[75] the date of Nichakshu's reign would commence about [(870-20=)]850 B.C., or [(850-20=)] 830 B.C., as he was the son of Adhisīmakṛishṇa. But Pargiter has dated the commencement of Nichakshu's reign to 820 B.C.[76] The great flood in the Ganga may have come immediately afterwards whereupon the capital was shifted to Kausambi.

Counting Nichakshu and his successors upto Udayana there are 19 kings to be accounted for before the accession of Udayana. Calculating forward from the suggested date of the Bharata War at Pargiter's rate of 18 years per reign, the end of the period works out to [(850-(19×18)=850-342=] 508 B.C. or (830-342=) 488 B.C. or (820-342=) 478 B.C. It is already known from the Buddhist accounts, as discussed earlier in this Chapter (pp. 26-27) that Udayana was a contemporary of the Buddha, as of Pradyota, and the demise of the Buddha is known to have taken place in 486 B.C. The date of the commencement of the reign of Udayana, on this calculation, is so remarkably near this date that a reasonable reduction of the reign periods of some of the intermediate kings would easily accommodate him within the framework of the Buddha's date, and would make a plea for the near-accuracy

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of Pargiter's calculations. Though there is nothing definite to prove the historicity of Udayana of the *Purāṇic* lists, the convergence of several literary works about him, and the concrete discovery of the Ghoshitārāma monastery, attributed by literature to his period, and of the palace in recent years would plead for the acceptance of the king as a historical figure.[77] Circumstantial and even archaeological evidence, limitedly though, would make a similar plea for Pradyota of Avanti also and bring them both along with Bimbisāra and Ajātaśatru within the framework of the Buddha's chronology, which fits in with the presently interpreted archaeological evidence on chronology too. The evidence of the fortifications at Kausambi would impart to the earliest settlement there the importance and dignity of a capital city.

The evidence at Ujjain has shown that the dating of its earliest Period (I) would be somewhat later than the commencement of Aryan settlement under Nichakshu at Kausambi. This is indicated not merely by the extreme paucity of the Painted Grey Ware, but also by the tell-tale simplicity of the painted bands on the ware. It is also to be noted that there is no hiatus between the earliest Period and the next succeeding one at Ujjain, as the cultural equipments of the two Periods overlap. The introduction of the N.B.P. Ware and associated wares and materials in Period II at Ujjain must indeed have been an innovation. This must have come in the wake of the Avanti ruler's northern exploits and contacts and should have been possible, on the basis of the literary evidence, between the accession and death respectively of Pradyota i.e., between the end of the 6th and the beginning of the 5th century B.C.

(iv) *Views of Mortimer Wheeler and D.H. Gordon on the Chronology of the Painted Grey Ware*

As a germane consideration, incidentally, before closing this section, it would be necessary to examine the views of Sir Mortimer Wheeler[78] and D.H. Gordon on the chronology of the Painted Grey Ware as well as the succeeding N.B.P. Ware. On the stratigraphic evidence of its occurring earlier than the latter ware, found in a deposit of 6-7 ft. (±183-213 cm.) at Hastinapura, the key site for the present, the date of the beginning of the Painted Grey Ware can recede at most from two to three centuries, according to him. But the date of the N.B.P. Ware cannot at present be fixed earlier than the 5th century B.C., in the 'Ganges basin', and in the north-westerly region of the subcontinent comprising Charsadda, near Peshawar, besides Udegram in Swat, not before *circa* 320 B.C., on the alleged ground that its

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arrival in this reign "should be equated with the spread of the Mauryan Dominions from the Ganges to these parts after 323 B.C."[79] He is further of the view that "since Taxila was not dug stratigraphically in the modern usage of the term, these depths, on which Lal based his chronology are an unreliable guide".[80] On this showing, the inclusive date of the Painted Grey Ware is suggested by him to be *circa* 800-500 B.C.

The late Col. D. H. Gordon had also made similar suggestions.[81] To quote Gordon, "the dating of the Northern Black Polished Ware which follows the Painted Grey Ware, and of the Ochre-washed Ware (meaning, of course, the ochre-coloured ware of Hastinapura as suggested by Lal), which precedes it are factors in this problem, the evidence (then available) does not admit of the N.B.P. Ware being dated back earlier than 400 B.C., at the very earliest. A central date for this ware is not the fourth century B.C. but the second century B.C.". He goes on to write, "It seems unlikely that the Painted Grey Ware can carry us back earlier than 650 B.C. and this I regard as optimistic." Gordon did not change his views very much while reviewing the position in a subsequent publication, his first and only book.[82]

There is not much that argument can do against such firm convictions. The only remedy seems to lie in re-excavating Taxila or any other site where such documented evidence may be forthcoming with the off-chance of getting the evidence again in a modern stratigraphic excavation. Till that happens and turns the apple-cart, the foregoing analysis of the available evidence would seem to tilt the balance of inference in favour of a near-accuracy of Lal's basic but tentative chronological scheme. A Carbon date for any of these sites is not likely to be very helpful in view of the relatively large margin of swing for the central chronological pendulum, especially when applied to such late periods in human evolution with which the dissertation deals and where the discrepancy of even a couple of hundred years makes all the difference. The difficulties of the involved calculation and the possibilities of errors are no less overwhelming. Nevertheless, it would be worthwhile submitting stratified specimens from the relevant levels to the Carbon-14 analysis, if only to make sure of the margin of possible extension on both sides of the mean datum and build up a sort of inclusive chronological framework for what it is worth. Meanwhile, the benefits of 'thermo-luminiscence', the latest scientific method of chronological assessment, may also be extended to the concerned archaeological data.

The evidence of the fortifications at Kausambi would impart to its early settlement in the Painted Grey Ware Period the importance and dignity of a capital city associated with Nichakshu.

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The consequential repercussions of the inference detailed above on the early chronology of Hastinapura need no repetition.

C. Chronology of the Post-Chalcolithic-cum-pre-N.B.P. Ware Ironworks

(i) *General*

As the caption implies, the pre-N.B.P. ironworks, which are also post-chalcolithic, are evidenced on a small scale in west-central India. The main evidence is from Period II at Nagda with a support from Prakash, Bahal and Eran.

The cultural equipment of Period II at Nagda is in fact closely related to the cultural assemblage of Period I of Ujjain, and, would, therefore, have also a corresponding date-scheme, with a possible earlier beginning. This is, to an extent, dependent on the chronology of the preceding cultural Period I or the chalcolithic proper, of which the evidence in hand is large, but firm conclusions as to chronology have so far been postulated in respect of Maheshwar-Navdatoli and Nevasa respectively with provisional datings suggested for Nasik and Jorwe, Brahmagiri and Maski as well.

(ii) *Tentative Chronological Scheme*

The earliest chronological estimate applicable to the neolithic-chalcolithic cultures in general was offered by Wheeler when he dated the IA culture at Brahmagiri to the beginning of the 1st millennium B.C.[83] Wheeler's dating was clearly tentative, based on the dating arrived at in respect of the overlying deposits of the megalithic culture. Nevertheless, it served as a basic starting point. During the fifteen years that have rolled by since Wheeler's work at Brahmagiri, the volume of work in and around the region, and, connectedly, on the problem itself as a whole has grown enormously, bringing in its train a corresponding mass of new evidence. While Sankalia has shown that the chalcolithic culture has impinged itself on the neolithic[84], Krishnaswami has endeavoured to show that the chalcolithic culture is an offshoot of the neolithic, with newer elements, which seem to have a western inspiration[85]. The recent excavations at Daimabad[86] confirm the former view and establish that the chalcolithic culture impinges itself on and dovetails with the neolithic culture. This is borne out by the evidence at Brahmagiri, Sanganakallu and Maski as well. Since the culture has been proved at Rangpur, Prabhaspatan and Somnath as stratigraphically post-Harappan, a new

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probable lower date, posterior to the terminal date of Harappa, viz., *circa* 1500 B.C., could be reasonably stipulated. Meanwhile, the publication of the date of Carbon-14 studies of C. materials from Navdatoli[87] indicated a date-range of 1631-1375 B.C. for Phase III of the culture there. The 5 ft. (152.4 cm.) accumulation below the deposits of Phase III, for which no C. 14 dated are available, would call for still earlier beginnings which have been estimated by Sankalia to *circa* 1800 B.C.[88] Thus the beginning of the chalcolithic culture in general tends to recede further backwards, and, as suggested by the excavators, well before the end of the Harappa civilization. The culture is characterized throughout, apart from microliths and objects of copper, by the pale red ware ceramic painted variously in black and a black-and-red ware pottery painted in white pigment as at Ahar in Rajasthan, by the white-slipped ware in phases I and II, and by the emergence of a sturdy matt ware with a metallic ring, called the Jorwe ware. The date-scheme is further supported by parallels with Iran in shapes of pots and painted designs. These have a further bearing not only on the source of inspiration of the elements of the culture-complex, but also on chronology.

It is clear that the chronological assessment in respect of the chalcolithic culture at Navdatoli can only be generally representative. Any subjective chronological estimate for the two early phases at Navdatoli is bound to lack definiteness though related to the more firm date in respect of the next succeeding Phase III. As regards the date-range 1631-1375 B.C., there is no reason why the upper limits of this period may not be nearer to the truth than the other, notwithstanding the well-known flaws of the method of dating under consideration.[89] It is clear also that the culture-complex at Navdatoli does not have any stratigraphic connexion with Harappa. Nor is there any material found here that can be described as an inflow from Harappa. It is, therefore, rather strange that the culture, which has been assessed, on the showing of C. 14 studies of material from Navdatoli, as a later contemporary of Harappa, imbibed little or nothing from this well-established and far-flung civilization, while it could not forget the influences, howsoever meagre, transmitted from distant Iran. It is all the more so as the site at Navdatoli, not to speak of other sites, including Nagda, further north, was well within the distributional zone of Harappa civilization. Navdatoli could easily have had contacts with Telod and Mehgam along the Narmada, if not Bhagatrav, along the Tapti. The absence of influences from Harappa and the discovery of a post-Harappan horizon for this culture in the Kathiawar region would plead generally for a posterior date and it would not be unlikely, if the higher

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dating, viz., *circa* 1375 B.C. for Phase III at Navdatoli is correct, and, on this basis, a date after *circa* 1500 B.C. for Phase I is stipulated as the inceptional datum.

The adduced Iranian contacts would, further, have been transmitted over a land route, as the inland distribution would show. If so, the overland route would have lain either through the Makran or the Bolan pass in Pakistan, and the trend would have been from the north to south. The northern sites would, therefore, have chances of an earlier settlement than those further south. Against this background the significance of the post-Harappan occurrence of the culture in Kathiawar need only be mentioned. On this analogy, sites like Navdatoli would have even a slightly later beginning. This would also plead for a post-1500 B.C. date for the beginnings, and Nagda by close association, and in consideration of its nearly common cultural repertoire and geographical location, would begin anywhere slightly before the beginnings at Navdatoli.

It has already been mentioned that the white paint tradition of the black-and-red ware at Lothal appears as a precursor of the similarly painted black-and-red ware at Ahar. The painted black-and-red ware of the chalcolithic cultures at Navdatoli or Nagda seems to be derived from its prototype at Ahar. Even this would plead for a later date for its earliest occurrences both at Navdatoli and Nagda.

In this context, the evidence of this culture being later than the later phases of Harappa, on the analogy of Rangpur and Prabhas Patan referred to above, is worth consideration.

(iii) *Archaeological Evidence at Nagda*

The chalcolithic culture at Nagda has two phases, of which the earlier, called Period I, is represented by 17 ft. 6 in. ($\pm$5.16 m.) of strata containing on an average 22 layers and six structural phases. The culture in Period I, characterized by microliths, painted and other pottery and a little copper, shows affinities, very limitedly though, with the earlier stone-axe or neolithic culture in the form of red ochre decorations on burnished grey ware carinated jars. This, in fact, forms a connecting link with the neolithic culture in general.

By and large the culture at Nagda conforms to the typical Malwa ware culture and is marked only by the absence of the white-slipped ware of Navdatoli or even the typical Jorwe ware.

A sturdy pale red or creamy-slipped ware, of well-levigated clay, fine fabric and smooth feel occurs, however, towards the end of the Period. This ware has, further, a metallic ring and is

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painted usually in black, but exceptionally, as a variant, alternately in black and red, with plain, but uniform and well-executed bands, combining, rarely, with vertically drawn wavy lines. Though basically distinct from the Jorwe ware, it may well have been a prototype. This parallelism itself would strike a note of contact and, therefore, to an extent, of relative contemporaneity. Among the shapes, the typical dish-on-stand points to a leaning more towards the dish from Harappa than to any bowl form, and it is not, therefore, unlikely that it is an earlier feature. The corrugated-bodied jar with tall neck, oval body and stand, the channel-spouts, the dancing group of human figures painted on a red ware sherd, the crude hand-made dough- or bake-plates in red ware, simulating, in shape and use, those from Navdatoli, the black-and-red ceramic further distinguished by dotted designs painted in a whitish pigment in imitation of ample prototypes from Ahar and the violin-shaped terracotta objects tentatively recognized as Mother Goddess help to bring the culture within the Navdatoli complex, and, therefore, the Iranian sphere of influence. This would justify for Nagda the same date-scheme as has been proposed for Navdatoli.

In this connexion mention may be made of Krishnaswami's *ad hoc* dating of the beginnings of the culture at Nagda, on the basis of thickness of strata to *circa* 2000 B.C.

Though no yardstick of chronological equations on the basis merely of thickness of strata can be invoked to arrive at chronological conclusions, a 40 years per ft. (±30.5 cm.) of accumulation would account for 700 years for the entire deposit of 17 ft. 6 in. (± 5.16 m.). The six occupational phases, covering on an average 116.6 years each would likewise account for 700 years, and would suggest a date around 800 B.C. as the terminal date. The duration of about a hundred years for an occupational phase cannot be held as excessive. At this rate the period for the formation of a stratum would be little over 30 years. The suggested terminal date of 800 B.C. is confirmed by the inference adduced below for the beginnings of Period II. Besides, Sankalia has pointed out that the terminal date for Phase IV of the culture at Navdatoli has been estimated, on the basis of C. 14 studies, to *circa* 1419-1169 B.C.[90] and this terminal phase, named earlier as 'D', was dated to *circa* 700 B.C.,[91] on the analogies of channel-spouts occurring in Necropole B at Sialk VI in Iran, which is datable to *circa* 1200-1100 B.C., or 1000-800 B.C. according to the excavator, R. Ghirshman.

Sankalia has already indicated that the cultural settlement at Nagda was within the Malwa group.[92] Taking into consideration the points of contact enumerated above, and the generally pre-

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ferred thesis of a north-to-south trend of the cultural movements, Nagda is likely to have a slightly earlier date than Navdatoli. As regards the terminal date of Period I, the cultural homogeneity with Navdatoli would bring it to *circa* 800 B.C. and possibly earlier still.

At the end of Period I the site was obviously abandoned for an indeterminate period. But that the abandonment of the site could not have been for long is clear as established by the continuance into the next Period of certain ceramic wares, and even microliths. This period of abandonment may be estimated at 50 years at the outside. This would place the beginning of Period II at *circa* 750 B.C. This is also borne out by the following consideration.

The second phase of the chalcolithic culture, in Period II, imbibes many new influences, and can no longer be designated as chalcolithic, as iron has already made its appearance at the very beginning of the new life on the site at the lowest level above the black soil separating the two Periods. That the gap could not have been for long is almost clinched by the Archaeological Chemist's analysis of the black soil as the result of decomposition of vegetable matter in stagnating water. While floods can account for the stagnation, they can also explain temporary abandonment of the site. The continuance of the earlier features points to the shortness of the interval before the next cultural Period, and the occurrence of iron speaks definitely for a new element in Period II.

Period II is represented by 6 ft. 9 in. (± 2.10 m.) of accummulation in approximately 9 layers and covers two structural phases. These should account for a span of 250 years at the rate of about 40 years (or slightly less) per foot of accumulation, accounting for a period of 125 years for the two occupational phases, consistently with the corresponding assessment for Period I. This is in agreement with the dating actually arrived at, namely, *circa* 750-500 B.C., as discussed below.

The most significant feature of this Period is its adoption of iron. At Ujjain, a more southerly site, but removed from it only by 35 miles (± 55 km.) and situated on the banks of the Sipra, a tributary of the Chambal, iron has been seen to occur at the earliest Period of habitation. The earliest cultural complex at Ujjain, called Period I, is dated, on the basis of the double-slipped red ware, occurring in the dish-form at Ahichchhatra in its earliest levels and also at Kausambi in the earliest Period, and sherds of the Painted Grey Ware, characteristically of its later and leaner days, to *circa* 750-500 B.C. as elaborated earlier. This culture is represented at Ujjain by a 5-7 ft. (2 metres approximately) thick deposit. The occurrence of iron objects in associa-

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tion with sherds of the Painted Grey Ware, in the lowest levels of Kausambi, at Alamgirpur, and a couple of slags at Hastinapura in the upper levels of Period II, i.e., in association with the last days of the Painted Grey Ware on the site provide the sum total of corroborative evidence, so far known, on the dating suggested above. The chronological horizon of all these earliest occurrences of iron at different far-flung sites is almost uniformly the same.

The chronology of the Painted Grey Ware, as of the N.B.P. Ware, has been discussed at some length above (see Chapter 3, pp. 12-15) and the conclusions drawn on the chronology in general hold good for Period II of Nagda on the grounds of its affinities with Period I of Ujjain.

(iv) *Evidence of Iron*

The evidence of the occurrence of iron throughout the deposit of 14 ft. ($\pm$ 427 cm.) thickness below the lowest occurrence of the N.B.P. Ware at Prakash would also point to a similar chronological level for the beginning of iron on the site, considered in conjunction with the evidence at Alamgirpur, Hastinapura, Kausambi and Ujjain. It is further to be noted that the iron-bearing deposit at Prakash is separated from its immediate predecessor, the chalcolithic, by a thin deposit of gravel. As Prakash has been considered an outlier of the Malwa group,[93] its link with Nagda is recognized, and the terminal date of the culture cannot be very far removed from *circa* 800 B.C.

As the culture of the Period II of Nagda is closely related to the culture of Period I of Ujjain, the Period II settlement at Nagda would also have a corresponding date-scheme, with a possible earlier beginning. The black-slipped, vesiculated and black-and-red pottery wares and types, besides the incurved bowls in unslipped plain red ware and collared basins in slipped red ware easily establish a close parallelism between the two. The Painted black-on-red ware or the microliths of Nagda, however, are entirely missing from Ujjain. Among the other wherewithals the iron objects present a further point of contact and chronological parallelism. Though the chalcolithic repertoire would tend to plead for an earlier date for Nagda Period II, the chronological limitations of iron would point to a date around 750 B.C. Ujjain was, obviously, on the basis of the find of specialized iron tools in Period I, and of a larger evidence of iron objects in Period II, a centre for the manufacture of iron. If the developmental trend of iron was, as it appears likely, from the north to the south, Nagda could not have escaped its impact, when still on the march, earlier than Ujjain, having a more northerly situation. If on the

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contrary Nagda imbibed its iron from Ujjain, its date would not be very far removed from *circa* 750 B.C. in either direction as Nagda is not more than 35 miles from Ujjain. As iron occurs for the first time right at the beginning of Period II at Nagda, the lower date of this Period, on this analogy, would be *circa* 750 B.C. Granting for a moment that Nagda imbibed its iron from Ujjain, being obviously a contemporaneous habitation of less importance, the date of its arrival at Nagda could not, in any case, have been very much later than *circa* 750 B.C. Period II of Nagda would, therefore, have a date-range corresponding to Period I at Ujjain, namely, *circa* 750-500 B.C. The occurrence of a square punch-marked copper coin towards the upper levels of this Period at Nagda would be a further argument in the present state of knowledge for the dating suggested above, though such coins cannot yet be exactly dated.

(v) *Conclusion*

The occurrence of iron at Prakash, Bahal and Eran prior to the N.B.P. Ware is manifest. Granting that the N.B.P. Ware took some time to travel to peripheral regions, it could not plausibly have taken longer than a hundred years. Even so the actual occurrence on these sites may be put at a still later stage in its fairly long life. This factor need not be common, and is actually indeterminable. The evidence for the chronology of Period I at Ujjain has already been discussed at length, as also for the preceding chalcolithic culture. There is, therefore, no difficulty in locating the date of iron characterizing this culture in accordance with the date-scheme proposed. The evidence at Nagda is, therefore, another landmark in the evolution of iron in India. Its inspiration is doubtless to be traced to the northern plains of the Ganga and Jamuna respectively.

D. Chronology of the Megaliths of South India

(i) *Introductory*

The chronology of the megaliths in south India cannot indeed be dealt with in isolation from the variegated vestiges of allied practices, which, in some case, are in vogue till to-day within the bounds of India and in the bordering regions. These can, in fact, be divided into three distinctive groups, leaving out those in the south, namely, (i) the cairn-burials of Baluchistan and Persian and Baluch Makran, (ii) the straggling remains of megaliths in

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the northern parts of India and the bordering regions including Sind and the former North West Frontier Province of undivided India, besides Ladakh and Tibet, and, (iii) megalithic relics raised traditionally till to-day by the tribal people, in middle and north-east India, and, limitedly, in south India.

The distinctive characteristics of each group and their interrelationships, which have a bearing on the source of inspiration and the directional trend of the megaliths into the south, and, connectedly, on their chronology will be dealt with below.

The upper limits of the chronology of the megaliths of south India are quite well-defined. The 1947 excavations at Brahmagiri showed the megalithic culture on the site to overlap with the succeeding Andhra culture, dated firmly with the help of coins of Tiberius and Augustus to the first century A.D.[94] The evidence at Sengamedu and Arikamedu, where the megalithic black-and-red ware dovetails with the rouletted ware, lends support to this chronological horizon. For the lower levels there is the evidence of the Eran coin in a cist-grave at Sulur, in District Coimbatore, dated to *circa* 3rd-2nd century B.C.[95] Then, there is the evidence of the occurrence of associative urn-burials without the megalithic appendage of the bounding circle, below a stūpa at Amaravati,[96] dated to *circa* 200 B.C., which points to a lower date well into the 3rd century B.C., if not earlier. The occurrence of a 9 ft. (± 274 cm.) thick deposit, bearing the megalithic ceramic at Sengamedu,[97] a habitation site but not associated with any megalithic remains, in District S. Arcot, points to a still further receding lower and a lengthening time-scale.

At Brahmagiri the megalithic culture overlaps in its lower levels with the upper levels of a neolithic-chalcolithic culture.[98] The evidence at Nagarjunakonda, District Guntur, Andhra Pradesh, shows the occurrence of iron objects, associable with the megaliths obviously posterior to the neolithic strata.[99] At Maski, District Raichur, Andhra Pradesh,[100] the evidence is similar.

Thus a date of about 300 B.C. for the commencement of the megalithic cult in south India has almost been conceded. But there are indications that the date would recede further backwards. As to the upper limits, the mention in *Maṇimekalai,* a post-Sangam work dated to 600-800 A.D.,[101] of the different methods[102] of the disposal of the dead, except cremation, met with in the megaliths and cognate, allied or associated monuments, with or without the megalithic appendage of the bounding stone circle, namely, (i) exposure, (ii) pit-burial, (iii) pot-burial, and (iv) cist-burial show their late survival.

Inscriptional evidence[103] points to the existence of the megalithic cult even as late as the 13th century. It is, however, the

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lower date of the introduction of megalithic practice in south India that presents a problem.

(ii) *Chronology of the Neolithic-Chalcolithic Cultures in West and Central India and the Megaliths*

Wheeler dated the neolithic-chalcolithic culture in central India within the 1st millennium B.C.[104] But the discovery in recent years of a far-flung post-Harappan chalcolithic culture in western and central India and northern Deccan in levels which could be chronologically placed between *circa* 1500 and 800 B.C.[105] has changed the picture of the neolithic-chalcolithic cultures as earlier presented by Wheeler. This later chalcolithic culture is seen to impinge itself, as at Brahmagiri, on the neolithic,[106] and, by implication, calls for at least a parallel chronological range, if not an anterior, for the neolithic culture as well. By stratigraphic connexion or interlocking with the preceding neolithic culture in the lower levels, a correspondingly early beginning for the megalithic culture is also called for.

This is strengthened by the considerations of the origins of the megaliths themselves. An independent origin of the megaliths in south India, and an attendant south to north expansion of the culture, as earlier suggested by Wheeler, are clearly ruled out in the light of recent evidence. But the most overwhelming evidence is the similitude of the port-holed cists of the sepulchral remains in structure and import, including the bounding circles or their simulating or masquerading counterparts, though chronoligically earlier, on the Mediterranean or in the Caucasus region,[107] which tilts the balance in favour of the alleged western mornings of the Indian megaliths. By association in space, import and typology of contents, the same observation should hold good for the innumerable variants of the sepulchral remains, classified broadly as megalithic, in south India.

(iii) *Cairn-burials in Baluch and Persian Makran and Baluchistan*

(a) *General.*—An interesting link in the chain of evolution of the megaliths in south India is suggested by the occurrence of the cairn-burials brought to light by Sir Aurel Stein, in Persian and Baluch Makran as well as in Baluchistan.[108] Some of these had been observed earlier, as far back as 1877, by Major E. Mockler, who opened quite a few of them and prepared an interesting account of his finds.[109] The monuments consist simply of a cir-

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cular wall, built of blocks of stone, 3-5 ft. (± 91-152 cm.) high, endorsing a cairn 5-15 ft. (± 152-456 cm.) wide. The tumulus enclosed was seen mostly to contain fragments of human bones, obviously recovered after excarnation, as was the practice in southern megaliths, occasionally calcined as a result of primary cremation. The skeletal remains were accompanied by pottery vessels in the shape of flattish flasks, with grooved lugs for a carrying cord, spouted jugs, animal bones including occasionally the head of a horse, and bronze or iron objects, the last being found in five of the sites out of a total number of twenty-four in the area. These graves belong apparently to the megalithic order. The occurrence of the head of horses is another striking connecting link. The usual equipment among objects of iron in the south Indian megaliths which suggests extensive use of the horse, consists of the horsebit. In a few cases even the head of a horse, as at Junapani,[110] near Nagpur, or in Salem has been found to clinch the similitude.

One of the tombs at Dambakoh is a square chamber with an opening on a side or port-hole.[111] Similar doors or openings, often elaborately flanked, have been found among dolmenoid cists, made of rough boulders, at a number of sites in the south.

Krishnaswami[112] has established that the structural features of these monuments are based for the most part on the characteristics of the stones employed for the monuments. In regions where the material is not easily tractable, rough boulders are hauled up to form the dolmenoid cist burial chamber, occasionally leaving a deliberate gap in the chain, subsequently blocked up. This feature at Dambakoh is comparable with a similar feature in the south.

In another instance there are double enclosure walls, as though there were double circles of stones. The enclosing walls, built of blocks of stones, recall those observed at Brahmagiri round the cists. Wheeler describes the primary enclosure at Brahmagiri in the following words: "The tomb thus formed was surrounded by a dry stone wall.....The surrounding wall might complete the structure but was more often supplemented by a circle of untrimmed granite boulders."[113] The parallelism is striking indeed.

The method of disposal of the dead employed was clearly post-exposure or-excarnation as in south India. The practice of exposure prevailing in the region in Alexander's time has been reported vividly by one of his historians, namely, Didorus,[114] who describes the elaborate process of how a dead body was left in the coppice, stripped of all clothes, to be devoured by birds and beasts of prey.

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The occasional occurrence of calcined bones is also paralleled as a variant in the megaliths of the Krishna and Godavari valleys.

The presence of iron objects amid the tombs was disturbing to Sir Aurel Stein, and he voted for a date in the early centuries of the Christian era[115] for these cairn-burials. He was no less influenced in this chronological assessment by the occurrence of a pot with an impressed Hellenistic motif in a Moghal Ghundai cairn together with a bezel ring of bronze with an intaglio.[116]

(b) *Cairn-burial Pottery and the Londo Ware and their Links with Iran.*—The pottery found in the cairns is a red ware, but occasionally painted in black volutes or pot-hook spirals.[117] Gordon asserted that the makers of the Londo Ware,[118] found in as many as thirty-seven sites including Alizai, near Surab in North Baluchistan, in the Baghwana valley of Jhalawan in Baluchistan (Pakistan) by Miss Beatrice de Cardi, named after the type site, and those of the pottery found in the cairn-burials are at least contemporaneous, if not identical.

The Londo Ware is dated by Miss De Cardi, on account of its affinities with the Persian pottery of Sialk VI B to *circa* 1200-1000 B.C., in keeping with Schaeffer's date-scheme in preference to Ghirshman's original dating of 1000-800 B.C. Though cairns are recorded near the site, no pottery nor bones were found in them.

The pottery was made from a pinkish red paste—with a gritty composition and a rough surface, caused inferably by the admixture of husk. It was not, however, wheel-turned but well fired, dipped wholly or partly in a darker slip and decorated with black or polychrome designs. The shapes include carinated bowls, beakers, goblets with a small pedestal foot and vessels with handles and plain lids.

The painted designs consist of parallel bands, pot-hook spirals, voluted scrolls, hachured triangles, and rayed discs painted in black on a red or maroon slip. White or a varied shade of red was employed to bring out polychrome effect. Black or brown designs were occasionally painted on a buff surface.

The similarity with Sialk VI B is strongly established by the motif of a frieze of horses, occurring on the Londo ware, and these are similar to their counterparts on spouted jugs from Sialk VI B (fig. 6). A horseman seal at Sialk VI B (fig. 7) lends support to the identity and to the idea of horse breeding emerging rather on the plateaus than on the southern plains. This is corroborated by the find of horsemen seals occurring in Assyria in the 9th and 8th centuries B.C.

Other motifs of Sialk VI inspiration are the metopic groups. The griffins bear resemblance to two statues of the time of Nebu-

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chadnezzer (1145-1123 B.C.) and lend further support to the suggested chronological assessment.

Miss De Cardi is definite that the animal motifs of Londo are of Sialk in inspiration, though they are far less vigorous.

In view of the prevailing evidence, the Londo ware was attributed by Miss De Cardi to *circa* 1250-1150 B.C. or the early years of Sialk VI B, and considering the time taken by this ware to travel further south, a date around 1100 B.C. or later is considered adequate for its arrival there.

Though the nearness of the Londo ware to the Sialk VI B pottery is clearly established, the connexion between the cairn-burial ware and the Londo ware was not obvious to the explorer. Nevertheless, the link between the Zhob sites and Sialk can be traced through the Nad-i-Ali evidence in Afghanistan, where a characteristic Sialk VI B long-spouted vessel was found with simple polychrome pottery.[119]

It is also important to note that both Moghul Ghundai and Nad-i-Ali have yielded specimens of the trilobate iron arrowhead, which is absent at Sialk VI B, but occurs in the Iron Age levels at Boghaz Keui and Alisar Huyuk in Asia Minor.[120] This has led to the suggestion of a post-Sialk VI B date for the cairn-burial sites.

Miss De Cardi has further made the point that the cairn-burial pottery from Zangian, Jiwanri, Dambakoh and Gatti, three of which sites except Dambakoh have also yielded iron, besides other cairn-burial sites in south Baluchistan, bear close similarity to the late Luristan ceramic. It is a brittle, wheel-made red ware, similar to the red ware of the Londo sites in the Zhob valley, and is decorated with a white slip. The motifs comprise simple scrolls, volutes, triangles and bands (fig. 6).

The jugs with fan-shaped spouts from Jiwanri and Zangian are linked to those from Sialk VI B. The narrow-necked flasks with loops for suspension are similar to late Luristan types as well as those from Sailk VI B (pl. II and fig. 21). The straight spouted jug with rope like handles from Zangian is paralleled at late Luristan. The same conclusion holds good for the hachured triangles and wavy lines of Jiwanri. The occurrence of the horses' skulls in two cairns at Zangian, together with the evidence of the horseman seal at Sialk VI B and the horse motif in the painted designs of Sialk VI B present a connecting link among the entire complex.

It would be best to quote Miss De Cardi[121] in conclusion: "On general stylistic grounds it is suggested that the Londo ware should be ascribed to the early rather than the late phase of

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cemetery B, and the case for dating it to about 1100 or later is supported by analogies with motifs on Kassite boundary stones dated by inscriptions to 1145-1123. The impact of Sialk VI B ideas *can also be recognized in pottery* and grave goods from cairn-burials in Baluchistan. There is, however, no resemblance between the Londo ware and the pottery from the cairns and in view of its affinities with late Luristan, it is suggested that the latter ware should be ascribed to a slightly later date than Londo ware."

The only Londo ware site to be excavated is Alizai near Surab in northern Baluchistan. The pottery from the site has not been published, but thanks to the generosity of Miss De Cardi, I have had an opportunity of examining the pottery from the site at her office of the Council for British Archaeology and also at the British Institute of Archaeology, London. The excavations have revealed the occurrence of two wares in the Londo miscellany, belonging respectively to two successive levels. The earlier one is a red ware, slipped and painted. The shapes in this ware comprise: (i) jars, small and medium-sized, with rolled and flanged rims, and a concave profile below the rim, and (ii) an elongated bowl with a slight carination at the base. The painted designs comprise plain concentric bands, volutes, in different varieties, forming incomplete loops connected with horizontal lines, and designs of fish, frog, the human figure or tree.

The other ware, which is later, is whitish (washed) or buff with simpler painted designs, comprising simple lines, angular strokes and dots etc. The shapes in this ware are mostly jars with almost flanged rims and concave necks joining with the globular body at a slight carination, and bowls with a pronounced flanged rim.

In spite of the differences between the Londo ware and the cairn-burial pottery, the basic under-current of a connecting link between the two through Sialk VI B and late Luristan forces itself, and is admitted or recognized even by Miss De Cardi herself. Gordon, however, is more emphatic about the inspirational link,[122] which appears to be clinched by the horseman seal, the burial-cairns, some of the painted designs (fig. 6) the flattish flask type vessels and also objects of iron.

The Londo ware is analogous again to the pottery found in Sialk VI B, which is dated by Schaeffer to *circa* 1200-1100 B.C. and by Ghirshman to 1000-800 B.C. Gordon, however, was more inclined to accept Schaeffer's chronology, and allowing a time-lag of nearly three hundred years for the tradition of the cemetery B ceramic to trickle down to Baluchistan, he fixed the date of the Londo ware, and therefore, of the associative cairn-burials

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at *circa* 850 B.C. But the Moghul Ghundai cairns, being considered later, were dated to *circa* 650-450 B.C. by Gordon.[123] There is no justification for such a late date on the ground of the two disturbing finds alone, referred o above, in view of the extreme speed of Sir Aurel Stein's otherwise exemplarily excellent works. To use his own words, "out of this number fully 178 were opened and examined by us in the course of four days' strenuous work".[124] It was quite possible for his workmen, pressed for such a short time, to mix up evidence, even from unrelated sources.

(c) *Cairn-burials and Megaliths in Upper Iran and South India.*—It is not unlikely that the megalithic disposal of the dead as represented by the dolmenoid cist like monuments at Dambakoh, with the prototype of the port-hole and the use of iron, came from upper Iran, the Talish basin. It may be noted that the port-holed dolmens circumscribed by circles, occurring in the upper regions of the area between the Black Sea and the Caspian Sea, around Koban,[125] belong to the Bronze Age, and are dated before *circa* 1500 B.C. Similar monuments *in* the Talish basin,[126] further south, are first noticed towards the end of the Bronze Age. The dolmen graves of Tulu,[127] Chirchir Pori,[128] Agha Evlar,[129] Chagouladerré[130] of the Bronze Age were found to be re-used in the Iron Age together with the interment of iron objects in the form of spear-heads and daggers or swords with bronze handle. The emergence of the iron-using folk is set down by Schaeffer to a wide-spread chain reaction caused by the invasion of Asia Minor (Turkey), and the expulsion of the Hittites, who sought refuge in Syria.[131] This point has been discussed at length in Chapter 5. The Kassites too were dispossessed of their Assyrian hegemony about this time. Above all there was almost simultaneouly an intrusion into Iran of an iron-using people. The date of these tombs with iron objects has been fixed by Schaeffer as referred to above, at *circa* 1200-1100 B.C. From here to the south-eastern regions of Iran bordering on the north-western marches of the Indo-Pakistan subcontinent was not indeed a far cry.

The possible connexion between the two regions is also suggested by a flattish flask[132] (pl. II & fig. 21) type of vessel with lugs for a carrying cord, possibly for slinging alongside a pack animal, as though in the use of a folk on the march, occurring at Sialk VI B. Besides, the occurrence of horseman figures[133] on a seal at Sialk VI B points to a similarity of propensity with the cairn-burial folk, who appear to have loved their horse dearly enough to bury it alongside the human remains in the same tomb.[134] Like them the cairn-builders were also possibly horse-breeders. This characteristic of the use of the megalith-builders

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of south India, where the horse-bit and, occasionally, the head of a horse itself find a place alongside the repertoire of arms and grave goods, is very striking indeed.

(d) *Date of the Cairn-burials in Relation to South Indian Megaliths.*—As stated before, the cairn-burials have been dated between *circa* 850 and 450 B.C.[135] The basis of this chronology is the relationship with Sialk VI B. The prevailing discrepancy of chronological assessments, however, makes a firm chronological conclusion in regard to the linked Londo ware and the cairn-burials rather difficult. Counting a central *circa* 1000 B.C. as a compromise, a date-range beginning about 800 B.C. can be reasonably postulated for the cairn-burial culture in general.

The directional trend of the cairn-burial ceramics as well as its megalithic aspect is obviously from Iran. But from the point of view of the manner and contents of the interments, the cairn-burials are closely connected with the megaliths in south India. In Iran, between the Black and Caspian Seas, there is the continued evidence of a tradition of megalith-building from the Bronze Age. The occurrence of the dolmen with the substitute opening for a port-hole, a comparable caramic in the form of the flattish flasks with spouts, which could be stoppered and slung on the side of their pack animal, obviously the horse, point to a connexion that cannot be brushed aside. The chronological range, though not firmly fixed yet, is related. The horseman seal found at Sialk VI B and the horse head in the cairn-burials, forge another link. The horseman seal is dated to 1300-1000 B.C. by Schaeffer.

In view of the above-mentioned facts it would not perhaps be hypothetical to state that there was a connexion between the dolmens of Iran and the associated monuments in a continuous stretch covering E. Iran and Near-India (Pakistan). Similarly the connexion between the cairn-burials of S. E. Iran and N. W. Pakistan on the one hand and with the megalithic monuments of south India on the other is indicated. The post-excarnation fractional burial, the port-hole or its prototype and the presence of iron, besides the close association with and attachment to the horse in the form of the horse-bit form the connecting link. The presence of animal bones. besides human, is another significant feature in common. But the most important link among the three groups is provided by the indisputable, if a little disturbing, occurrence of iron everywhere.

Gordon Childe's view[137] on the possible link between cemetery B of Sialk in Iran, on the basis of the port-holed slab, and those in India, is another support in regard to the directional

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trend and the chronological compatibility of the cemetery B of Sialk with the dolmens of the Talish basin.

(e) *Comparison between the Iron Objects of the South Indian Megaliths and those of the Cairn-burials.*—If the hypothesis of the megalithic inspiration in India from the cairn-burials be true, it is likely that the megalith-builders obtained their knowledge of iron from the cairns themselves, and possibly from other sources as well. The difference in cultural repertoire among the cairn-burial zone of Iran and the Pakistan border and the megalithic zone of south India relates mainly to the ceramics. In so far as the iron objects themselves are concerned, the arrow-heads and spear-heads show similarity in form to those from the megaliths, in general, and a comparison of tool types (Tables 2, 4 and 5; figs. 2, 3 and 4) shows several parallels, viz., barbed arrow-heads, swords, daggers, knife and hook.

The establishment of the link between the cairn-burials and south Indian megaliths attempted here would, however, depend on the elimination of rival claimants to megalithic inspiration in south India. To these we must now proceed.

(iv) *Megalithic Remains in Other Parts of North India and Adjacent Border Regions*

(a) *General.*—If the south Indian megalithic monuments, with port-holes have any moorings with the west, as they appear to have with Sialk VI B, and through them with those in the northern regions of Iran, described above, the cairn-burials in the Makran and Baluchistan form a significant connecting link. But the intervening land-mass between peninsular India and the cairn-burial area is a formidable gap. But it is not entirely devoid of what may be relics of intermediate links in the chain. In fact, throughout the length and breadth of India there are remains of monuments that could be related with the megaliths of south India, but they are too isolated from one another and the interconnections are yet not clear. Nevertheless, even a brief consideration of the evidence is likely to be rewarding.

(b) *Sind.*—The most important of these remains are those reported from the neighbourhood of Karachi. Captain Preedy, Collector of Karachi, about a hundred years ago, described the occurrence of stone-graves on the hills near Waghodur[138] in the shape of dolmens or slab-cists throughout the hilly district and extending towards the frontier. He also emphasized that these graves

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exactly resembled those described by Captain Meadows Taylor and Captain Congreve in the Deccan and the Nilgiris respectively.

H.B.E. Frere, then Commissioner in Sind, observed the occurrence of cairns and cromlechs such as described by Captain Meadows Taylor on the road to Shah Bilawal in Baluchistan and also in the hills on the direct road from Karachi to Kotri.[139] Wheeler has found some remains of cists and stone-circles in the region following these hints. But no port-holed dolmen could indeed be found. It is a pity that those remains have not been excavated, for exposure alone would establish their antecedents.

(c) *Delhi, Uttar Pradesh, Orissa and Rajasthan.*—Cunningham reported the occurrence of 'cromlechs', cairn and stone-circles in the hilly parts of the District of Delhi and Mirzapur and in Orissa.[140] These are apparently megalithic monuments. Wheeler has stated that these observations had not been confirmed.[141] But the discrepancy under the circumstances need not be attributed to inadequate or incorrect observation by Cunningham. The disappearance of some of these monuments, through the ravages of time or even of the deliberate but unknowing human hand, cannot be over-emphasized, assuming that the sincerest search has already been made for their re-discovery as claimed.

A. C. Carlleyle observed a cromlech within one of four stone-circles at Deosa[142] near Jaipur in Rajasthan. Similar monuments were observed at Khera[143] near Fatehpur Sikri, Satmas,[144] besides, granite and slate 'cromlechs' at Deodhoora,[145] near Almora in U.P. At Visalpur[146] in Rajasthan he found an ancient arrow-head, which is made of iron in an apparently megalithic context.

(d) *Kashmir, Ladakh and Tibet.*—Further north menhirs have been noted at Burzahom[147] near Srinagar in Kashmir. Burial-cists have also been observed in Leh valley of Ladakh, on the border of Tibet.[148] The excavations conducted on some of these in 1903 and 1909 have yielded burials containing disarticulated human bones, accompanied by bronze and iron objects. The ceramic contents are impressed or painted in dark red colour.

Menhirs and associated monuments are reported from Tibet. Many of these are said to be covered up by sands and the local people have no idea of their significance.

(e) *Former N.W.F.P. of Undivided India, now in Western Pakistan.*—The discovery of a stone circle at Asota,[149] 17 miles east-north-east of Mardan in the former N.W.F. Province (now in West Pakistan) needs only to be mentioned.

It is not easy to connect these diverse remains with the megalithic culture of south India, but the similarity of the remains is

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arresting and calls for a thorough investigation, for they may have a bearing on the directional trend of the emergence of the megaliths as well as their chronology. In this connexion attention may be drawn to the view of Heine-Geldern[150] that the megaliths have travelled to India in several waves, both from the east and from the west, but in every case over the land route.

(v) *Megaliths in Middle and North-East India Practised by Tribal People*

(a) *General.*—Apart from the burial monuments of the past, there is yet another comprehensive group of monuments representing a living cult of megalithism with undoubted moorings in the hoary undetermined past. This covers an extensive area of the country and occurs in the middle-eastern and north-eastern parts of India amidst the tribal settlements[151] of the Mundas and Hos in Chhota Nagpur (Bihar), Maria Gonds in Bastar (Madhya Pradesh), Gadabas and Bondos in Orissa and Khasis and Nagas in Assam and some others in addition. In these regions the monuments are occasionally sepulchral as among the Mundas, Hos and Khasis, but mostly commemorative as among the rest, but limitedly both as among the Hos and Mundas. The forms of the monuments are also varied. Some among these are held as tribal property and zealously guarded, but some, possibly coming down from the olden times and forming some kind of megalithic monuments, are not so cared for. Some practices in Assam have a wide distribution in Indonesia, Polynesia, the Philippines and isolated groups of islands in the Pacific Ocean, and are considered to be integral to a common cultural complex in the South-East Asiatic region.

Among the people practising these living megalithic rites there are different linguistic as well as racial groups. The Mundas, Hos, Bondos and Gadabas are Austro-Asiatic in language, the Gonds are Dravidian in speech while the Nagas are Tibeto-Burman in language and Mongoloid in racial characteristics. Nevertheless, the underlying cultural bias seems to have been Austro-Asiatic-cum-Austro-nesian in inspiration. In this context it is interesting but anomalous to note the occurrence of the eastern tradition of the megalithic strain among the Gonds who speak a Dravidian language.

(b) *The Neolithic Association.*—It has been surmised and suggested that the monuments in this region were introduced by the Austro-Asiatic and Austronesian language groups. Distributionally this cultural complex is supposed to be coeval with the provenance of (i) neolithic shoul-

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dered adzes of Austro-Asiatic contribution, and (ii) polished neolithic celts of square cross-section of Austronesian contribution, respectively. The geographical contiguity of these monuments may suggest a genetic connexion, but it is yet to be firmly established. Heine-Geldern[152] sees in the megalithic complex ramifications of a cultural influence from the Mediterranean region transmitted over Central Asia and China by a land route. Haimendorf, on the other hand, is not very definite about its main source of inspiration and the course of its expansion.

The neolithic association in origin of these monuments as supposed by Heine-Geldern has not been examined. Even if the regional distribution of the shouldered adzes and the celts of square cross-section were to coincide with the distribution of tribal monuments of menhirs and dolmens, respectively, there is no ground for an *a priori* cultural and chronological association between the two. This point has been clearly indicated by. A. H. Dani in his recent work on the *Prehistory and Protohistory of Eastern India*. The issue of cultural equation and movement based on an unproved association of neoliths with megalithism raised by Heine-Geldern must, therefore, remain open until it is proved or refuted.

To quote Dani, "These (i.e. megalithic) monuments form a class by themselves and much fieldwork is needed before any connected account and chronological sequence can be given of them. One thing appears probable that the stone tools, of which the study is made here, can hardly be connected with them, since they have not been found in association with any megalithic remains..... J. P. Mills and J. H. Hutton point out that throughout the area of megaliths in North Cachar stone adze-heads are found, but it remains to be proved. My recent exploration of the Jaintiapur menhirs produced not a single neolith."[153]

Dani has equally assailed the grouping of neolithic cultures[154] in eastern India on the basis of the shape of the celt advanced by Heine-Geldern, as also their association with the movement of the Austro-Asiatic language groups. In his opinion, "the available evidence suggests the appearance of the tool types in India later, and, therefore, would not lend support to Heine-Geldern's chronological assessment of the emergence of the tool types before the Aryan migration around 2000 B.C."[155]

Notwithstanding these difficulties, it has to be admitted that the question can be solved only archaeologically. Till then the question of the origin of the megalithic monuments in eastern India and their relationship with the south Indian megalithic monuments should remain open.

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(c) *Relationship with the Megaliths of South India.*— Meanwhile, the basic differences between the two cultural and zonal groups can only be emphasized. While the southern megalithic monuments are sepulchral and belong to the Iron Age, the eastern Indian megalithic culture is commemorative and festive, being devoted to fertility, owing itself to the dead ancestors, and are possibly, though not yet proved, neolithic in origin. It may be said at once that the south Indian megalith-builders were also a settled agricultural folk, who employed tank-irrigation to enhance their yield and took special care to ensure that the megalithic monuments did not encroach upon their arable lands nor permit them to interfere with their cultivation of the soil. There are instances, as at Uttiramerur, in the Chingleput District, of a gigantic non-functional megalithic dolmen standing alone in isolation and majesty as a guardian spirit and sentinel on a rocky outcrop in the midst of a fertile field, securing the growth and safety of the crops as it were.

The cultural relationship between the groups deserves careful investigation, especially in view of the commemorative rituals of a handful of tribes in south India who still practise some attenuated forms of megalithism. These comprise[156] the Mala Aryans of Travancore, the Todas of the Nilgiris, the Kurubas of North Arcot, the Kurumbas of Mysore and the Tottiyans of Madura.

The Mala Aryans bury their dead and, as a secondary practice, inter a silver or brass image of the dead person, depending upon the affluence of the next of kin, or merely a representative pebble, among the indigent, inside a box-like chamber of stone laid into the earth. Food and drink are offered to the departed spirit on anniversaries.

The Mundas and their neighbours erect dolmens surrounded by stone-circles and put into them the skeletal remains of a whole family. It is possible that the Khasis imbibed this practice from them in turn. Certain common features between the megalithic and allied monuments in middle and north-east India are, however, undeniable, in spite of Haimendorf's insistence to the contrary. His argument, that the elaborate megalith-ritual and culture built up by the surrounding tribes or those in Assam could not have sprung from such humble beginnings as the monuments in the Kolarian area, is not strictly supportable, because the megalithic assemblage of south India is quite variegated and yet it seems to have sprung from the apparently humble or simple beginnings of the dolmenoid cist with port-hole and bounding circle, which, being the commonest form found over

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an extensive area, stretching even beyond the bounds of India, may be held as the standard norm.

In fact the megalithic form seems to have adapted itself continually to the local genius. The norm was perhaps the slab-cist circle. When the geological factors did not permit splintering of slabs, rough unhewn boulders were employed for the chamber, and the opening was provided by a deliberate gap amid the supporting stones. In the lateritic zones the stones were dressed on the inner side to provide a regular rectangular interior. The sarcophagi came in their turn to receive the mortal remains in the cists. The urns were also provided in the complex of funerary monuments and suitably protected in a pit. In the lateritic zone new experiments were made with local stone to provide for the preservation of the urn or sarcophagi in *Kuḍakals, Ṭopikals* or even in subterranean caves. Even the caves were excavated in the model of the slab dolmen and often provided with a symbolical opening at the top. The cave itself was girdled by a circle of stones. The circle around the cave was no longer utilitarian, but it stood, therefore, as a symbol of convention. The ever-new experiments appear indeed to have been the result of creative impulse adjusting itself to local circumstances.

Nevertheless, the cultural and chronological links between the middle Indian and north-east Indian megalithic monuments on the one hand and between these two groups and those of south India on the other are an unknown factor. In this context a possible point of contact between the megaliths of south India with some tribes in north-east India may, however, be recalled, for what it is worth. Some of the shell ornaments found among the megaliths in south India[157] are similar to those in use among Angami Nagas and other tribes inhabiting the Naga Hills District of Assam. The similarity led Hutton[158] to think that the Nagas contain an element which migrated from south India to the north-east through the Bay of Bengal. It is to be noted, however, that the raw material is imported by the Nagas from the sea coast via Calcutta. Shell bangles are used extensively by the married Hindu women in West Bengal to this day as an auspicious emblem of married status, and West Bengal has to depend for the bulk of her supplies of raw chank upon the chank fisheries of Madras to meet the demand for bangles.

It cannot, therefore, be claimed nor established as yet that the megalithic inspiration into south India had anything to do with the megalithic practices of tribal people in middle and eastern India. The contra-indications of any genetic connexions can only be emphasized for the present. The possibility of an influence spreading out from the southern focus into the northern or eastern

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regions cannot be ruled out. Common factors between the two groups may as well be attributed to a collateral influence in a two-way traffic. The possible extent of the impact of an eastern inspiration on the south Indian megaliths can best be imagined in the light of the latter's proclivities to the cairn-burials of Baluchistan, detailed earlier.

(*vi*) *Source of Megalithism in India—Divergent Views*

(a) *D. H. Gordon.*—In this study the route taken by the distributors of megalithism assumes some importance. Gordon's suggestion[159] that the megalithic idea may have travelled across the sea through Arabia has not yet been supported by any archaeological evidence of such an early cultural contact with Arabia but it deserves consideration and pursuit. Though the sea route to India from the west was not extensively employed until the discoveries by Hippalus[160] in the first century B.C., of the trend of monsoons, there can be no doubt about some pre-Hippalus sea contact between Arabia and India, especially by coasting. This, of course, would not prove that the megalith concept travelled in this manner in view, especially, of what has been stated above about cultural contacts betwen Iran, Pakistan and Peninsular India. The spread of the megalithic idea along the sea coast, as suggested by Gordon Childe and Wheeler, may not be strictly correct. In the beginning it may indeed have been coastal, if at all, up to a point, but in that case very soon it spread very deep into the hinterland. The megaliths in the Nagpur District, which represent the northern-most limits of megalithic distribution in peninsular India, are more than five hundred miles away from the western coast line.

Wheeler[161] has been looking tentatively to Karachi as the spring-board of the megalithic idea for entry into south India. If the consideration of moorings could suggest a link with the distant Caucasus region or even the Mediterranean coast, as suggested by Childe,[162] the cairns, more akin to the southern graves than to the distant western prototypes, would be the nearest known link, being also located on an intermediate zone between more distant distributional blocks.

(b) *R. Heine-Geldern.*—The occurrence of straggling megaliths or such monuments in north India, even beyond the northernmost latitudes bearing the cairn-burials, sounds perhaps a jarring note in the framework thus built up. But it is easily explained. There may be more than one strain of megalithic concept entering into India, as actually

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suggested by Heine-Geldern,[163] and some megalithic remains in northern regions can well be independent of the southern complex. The occurrence of bronze and iron objcts[164] in the cist-like graves in the Leh valley of Ladakh probably shows the incorporation of the megalithic monuments already within the Iron Age. This is likely to bear out Heine-Geldern's views about the movement through Central Asia. Such a movement could have been influenced by the impact of the Iron Age in the Talish basin or Central Asia. But until more is known about them further opinion has to be reserved.

In this context, it is indeed interesting to note that though cremation was the norm among the Aryans in northern India, burial was apparently known even in the days of the *Ṛigveda*.[165] In fact, elaborate rituals have been laid down in the sacred texts, of the post-*Ṛigvedic* phase, and this theme has been dealt with at some length by P. V. Kane.[166] It is extremely difficult to say if the burials described in the texts belong to the megalithic order. But from the utter paucity or absence of the related material evidence, their megalithic aspect may perhaps be discounted.

The *Ṛigvedic* references to burial are contained in *Ṛigveda* X, 15, 14, where the word employed is *anagnidagdhā* (not burnt), and in *Ṛigveda* VII, 89, 1, where the earthern tabernacle is referred to as *mṛiṇmayaṁ gṛihaṁ*.

Some passages in *Śatapatha Brāhmaṇa* (XII, 8, 1-4) refer to the collection of charred bones, and their placement in an urn, which was interred after a considerable interval, with the erection of a mound over it. It refers to the erection as well of a stone-circle around the mound.

The stages of disposal of the dead in ancient India consisted of (i) cremation, (ii) collection of charred bones, (iii) depositing them in an urn and interment underground and (iv) erection of a mound over the burial. It was, therefore, a practice of post-cremation urn-burial, under a mound or cairn-heap, enclosed by a stone-circle, that was limitedly practised. But the remains of not all persons were thus buried, for the charred bones were to be deposited either under a tree or cast into the Ganga river. The monument of a mound over a burial was also not erected in all cases.

At any rate, the relationship of the burials spoken of in the *Ṛigveda*, if any, with the megalithic practices is not clear, and any categorization on the matter at the present stage of research would be a presumption, fraught with hazard.

(c) *Walter Ruben.*—In this context, however, a reference may be made in passing to the view expressed by

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Walter Ruben, that the megalithic trait came into India from Palestine via Persia.[167] As interpreted by him, one strain proceeded to the south and the other towards the east till the land of the Mundas was reached. The truth of the latter event remains yet to be tested.

The Iranian connexions with the south Indian megalithic graves have been already indicated. Whether the Iranian megaliths owed themselves to Persia (i.e. Iran) or to a source outside Iran, is a moot point and beyond the scope of the question in hand.

Nevertheless, it may be hazarded that the megalithic monuments around Karachi, Delhi, Fatehpur Sikri and Jaipur are probably the straggling remains of the onward movement of the megalithic idea from Makran to Middle India and thence to the south. It is not possible to be categorical on this point without excavation. It seems fairly clear, however, that they are hardly the result of a back-surge, into what is now being held as the land of passage, from the south. The occurrence of an iron arrow-head in a megalithic context in Visalpur,[168] in Rajasthan, is possibly a significant link in the chain, and, if so, perhaps proves incidentally the prior acquaintance of the megalith-builders with iron before the entry into south India as an additional evidence to that from the cairn-burials.

(d) *Sir Mortimer Wheeler.*—Wheeler has pointed out that the expansion of the Mauryan empire into the south was signalized by a cultural wave, widely different from its predecessor.[169] It may be contended that the only Indian culture other than the Aryan which could have penetrated into the south at this time was surely the Dravidian. For the moment it will be assumed that it was so. The ultimate confinement of the Dravidian culture into the south also indicates, under the assumption, a pressure from those who were surging around further north.

To return now to the movement of the megalithic idea to the south, it may be pointed out that apart from the straggling and isolated remains of megalithic monuments in north India, of doubtful or unproved association with the south, there are indeed no other known monuments associable with the Dravidian speakers so far discovered in the north.

This can be explained by their apparent disadvantage and discomfiture at the hands of the expanding Aryan tribes, besides, of course, possibly of the assumed north-western, almost coastal, source of the megalithic concept. The few straggling remains may point to their passage through the land, as has already been

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suggested. A people on the move do hardly have the time for fastidious ornamentation. Their basic ceramic wares are possibly, therefore, plain, in contrast to the painted pottery of the cairn-burials or of the neolithic-chalcolithic cultures.

The other distinctive and characteristic component of the megalithic culture in south India is the controversial black-and-red ware pottery produced by the technique of inverted firing. It is difficult to be categorical about its emergence. Wheeler has suggested that the megalith-builders adopted this ware from the chalcolithic culture towards its end-phase and adapted it to their purpose. The adaptation displayed itself in the commonness of shapes and a gradual lengthening of the vessels the further south it went. The late Subbarao has shown, in a paper presented to the first International Conference on Asian Archaeology at New Delhi, in December 1961, that the black-and-red ware is the result of an integrated origin and development, going back to the chalcolithic times.

The adoption and adaptation of the black-and-red ware from the chalcolithic culture has been amply supported also by the evidence of Bahal,[170] in District East Khandesh, Maharashtra, where the similarities of the bowls can be clearly marked. The fusion between the two was perhaps crystallizing at this stage, as the funerary pottery at Tekwada,[171] on the opposite bank of the river Pravara, bears in addition grafitti marks, which appear in identical form, repetitively, on the black-and-red ware of the megaliths, obviously in imitation of the former.

The comparative plainness of the pottery of the last stage of the chalcolithic-cum-post-chalcolithic phase is also borne out by the almost total cessation of the painted black-on-red ceramic by which the plain black-slipped, black-and-red and the plain red wares in the post-chalcolithic-cum-pre-N.B.P. cultural horizon or Period II at Nagda is characterized. It is, therefore, fairly reasonable to postulate that the megalithic tradition imbibed the ceramic tradition of the chalcolithic culture, shorn of its decoration.

But the imbibing of the cultural traits would not stop short at the ceramic stage only. The mode of burial practised at the burial site of Tekwada[172] opposite the habitation site of Bahal could hardly have left the megalith-builders unimpressed. The incarceration was a common enough example before them. It was practised at Daimabad[173] and Nevasa[174] as well. In this context it is to be noted that the neolithic-chalcolithic culture at Brahmagiri was characterized by full burial of infants in urns and of adults in pits.[175] Though the urn as a receptacle for the

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dead remains was easily adopted, the mode of prior exposure and fragmentary burial, as characterized the cairn-burials in Baluchistan, could not obviously be given up. This is almost cemented by the evidence from Maski, where full as well as fractional burial in pits have been practised side by side[176] in the megalith-complex, even to the extent of the use of the deliberately laid bed of lime,[177] possibly intended for preservation as a link with the chalcolithic funerary custom as noticed at Nevasa, where the urns were lined interiorly with lime.

The chalcolithic culture in general lasted a long while, i.e., from *circa* 1500 to 800 B.C. and it is likely that the megalith-builders in the south, overlapping with it in the last stages, came into their own about 800 or 700 B.C.

This agrees also with the date-scheme of the cairns handsomely enough and gives the proposed correlation and interconnexion between them and the megaliths a considerable measure of probability.

Wheeler had earlier thought and announced that the megalithic culture would not go back earlier than *circa* 200 B.C.[178] The discrepancy of the assessment was pointed out by Haimendorf[179] when he said that the three versions of the inscriptions of the Edicts of Asoka, located concentratedly at and around Brahmagiri, namely, at Siddapura and Jatinga Rameshwara in addition, could not possibly have been addressed to the primitive neolithic settlements. The propriety of this argument has brought about a minor change in Wheeler's date-scheme as well in keeping with his earlier assessment. With the modified circumstances he has conceded *circa* 300 B.C.,[180] as the inclusive lower date. He has further offered the suggestion, rather firmly, that a strong and vigorous movement of the megalith-builders entered the south during the reign of the second Mauryan king, Bindusara, a short time before Asoka in the 3rd century B.C., but has aptly described it as "a gratutious historical intrusion".[181]

There is no indication anywhere, either in India's prolific literature or in stratigraphy, that such a revolutionary movement took place so short a time before Asoka's appearance on the scene. It may be noted that Asoka's grandfather, Chandragupta Maurya, abdicated the throne towards the end of his reign, and went as a recluse to the south.[182] The building up of the vast empire, therefore, is circumstantially attributed to his father, Bindusara. The fact that Chandragupta moved subsequently to the south, into the Mysore region, indicates that this region was already within his empire before his abdication about 300 B.C. The southward movement, suggested by Wheeler,

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appears, therefore, to have taken place well before the accession of Chandragupta.

It may be noted that Asoka's inscriptions[183] mentioning the four well-established kingdoms of Chola, Pāṇḍyas, Keralaputra and Satyaputras in the south presupposes a fairly early and long enough settlement for the evolution of civilized constitutional Government under monarchies in a land previously inhabited by the primitive neolithic agriculturists, as stratigraphy reveals.

The issue of the inscriptions, which were not merely court or official documents but public proclamations, meant no doubt to be understood by all and sundry, in the Prakrit language of the north in a land of Dravidian speakers would further presuppose even a fairly prolonged Aryan penetration into the region. The use of the Prakrit language was not merely a matter of pride for the ruling house within its domains. The use of both Greek and Aramaic in a recently discovered Asokan inscription at Kandahar[184] in Afghanistan and the use of the locally understood Kharoshṭhi script at Shabazgarhi and Manshera[185] in his inscriptions bespeaks the solicitous monarch's desire to be intelligible to his subjects, for he had a religio-social message to convey, seeking to place his people on the path of a gentleman's virtue, inspired no doubt by the Buddha. The use of the Brahmi script of the north for the Tamil inscriptions in south Indian caves belonging to the centuries immediately before the Christian era, is another evidence of an earlier penetration of Aryan influence.

In this context it may be recalled that the Aryan literature bears some ambiguous testimony to the megalithic mode of disposal of the dead, while *Maṇimekalai,* a piece of the post-Sangam literature, is replete with it.

There can be no doubt, therefore, that the megalithic mode of disposal of the dead in south India was associated with the Dravidian speakers, who appear to have entered into South India considerably earlier than Asoka. The cultivation of an advanced literature in Tamil, as the Sangam literature is undoubtedly acclaimed as a highly evolved literary creation, even as early as the first-second century A.D., would imply several centuries of its existence as a *patois* before the prolonged apprenticeship of literary endeavours, the earliest expression of which were the Tamil inscriptions in caves. This would indicate much earlier Dravidian beginnings in the south.

All these circumstances would point to a much earlier date than the days of Asoka for the introduction of megalithism into

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peninsular India. This is indicated by the fact of the absence of megalithic relics in the Mauryan levels in north India. As megaliths cannot be held as characteristic of the Mauryan culture, or of any other earlier culture in north India revealed by stratigraphy, with the exception of those recently discovered in the Varanasi and Mirzapur Districts, the occurrence of the megaliths in south India has to be attributed, of necessity, to some other cultural force, and the Dravidians come in handy to claim the plaudits.

(e) *Christopk von Fverer Haimendorf.*—It was Haimendorf who sought to connect the introduction of megaliths in south India to a distinctive linguistic group in India.[186] He expressed the view that the present distributional zone of the megaliths in peninsular India covers exactly the Dravidian speaking area. In view of the sequential position of the megaliths following, with an overlap, immediately upon the very primitive neolithic agriculturists, and in view of the obvious need of some degree of civilization to enable a people to comprehend and imbibe the full import of the Asokan inscriptions occurring within the megalithic zone, the prior existence of the iron-using megalithic culture at the time of the extension of the Mauryan sphere of influence into the south was a necessary pre-condition. Such a picture of civilized life in the south can only be attributed to the Dravidians in India, who, linguistically speaking, are now confined strictly to south India and this phenomenon should have been the result of a gradual losing of ground under sheer pressure of a more northerly people, no doubt, the Aryan speaking people, if not of any violent armed conflict with the latter. The question now is about the date when such an event could have taken place. It could not have been any definite point in time, affecting as it did a mass movement, but quite an expanse of time would account for such a movement.

The question whether the Dravidian speaking people could have imbibed the megalithic concept at any stage, whether before or in the course of their southward movement, needs to be established. Though a direct evidence on the point is not forthcoming at the moment, the circumstantial evidence, therefore, deserves consideration. As regards the chronological position of the infiltration of the Dravidian speakers, Haimendorf estimates that the middle of the first millennium B.C. and that they entered peninsular India about 300 B.C., i.e., before Asoka. He also places the course of their movement along the coast, and does not answer the question of the exact source of their megalithic concept.

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The linguistic evidence of the Dravidian language flourishing in the Indus plains at or before the time of the Aryan immigration into India[187] goes against Haimendorf's contention of chronology as well as of the direction of its movement.

The linguistic evidence on the question of the megalithic chronology has been dealt with by the author at some length elsewhere.[188] It has been endeavoured therein to show that it was the Dravidian speakers, who were once spread over north-west India at or before the time of the composition of the *Ṛigveda,* which on different accounts has a date-range of from 1500 to 1000 B.C., introduced megalithism in south India. They were being gradually pushed down southwards by the expanding and oncoming Aryans. On their way they had but a reasonable chance of picking up the use of iron, black-and-red pottery and also the megalithic strain, the triple characteristics of the early Dravidians, either from the cairn-burial folk or from the Aryans, with whom such burials were becoming unpopular at the time, or from both. The black-and-red ware could have come from the Ganga plain, where it was quite at home, even before 600 B.C., or with greater probability from the central and west Indian chalcolithic folks, especially as Subbarao has demonstrated the parallelism between the so-called megalithic black-and-red ware and the chalcolithic black-and-red ware, during its last days, as stated earlier. Though the *Ṛigveda* is acquainted with a form of burial, recalling the megalithic, it would, on the present showing, be an oversimplification of the case to attribute even a strain of the megalithic concept or practice of the Dravidian speakers to the Aryans.

Some of the cairn-burial folk may as well have accompanied the Dravidian speakers in their southward movement and accentuated the megalithic aspect. The find of brachycranial features in the Brahmagiri (Mysore)[189] and Yelleswaram (Andhra Pradesh) megaliths in India,[190] though very limitedly, and in the cemetery of Sialk VI B, in Iran,[191] which are otherwise culturally allied through the cairn-burials of Pakistan as a connecting link, lends support to such an inference. The cranial characteristics of the cairn-burial folk are at present unknown. But it is interesting to emphasize that the brachycranial people of Sialk VI B practised megalithism and employed iron.

The event of the Dravidian movement into the south was clearly post-*vedic,* in view of the substantial volume of North-Dravidian elements in the *Ṛigvedic* language[192] and at once pre-Mauryan, as shown above. The date of the Dravidian infiltration into the south, has, therefore, to be put between *circa* 1000 and 300 B.C.

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In this context the links with the cairn-burials, helps to date this movement more pointedly to around 800-700 B.C. The incorporation of the black-and-red ware and iron in their repertoire lends support to this date-scheme.

On these and other grounds, elaborated in the earlier paper of the author, the thesis regarding the source of megalithic inspiration and its date, as enunciated, stands vindicated. The linguistic and racial evidences too lend support to the new chronological scheme proposed, and it derives for the present, a limited but indirect support for the established directional trend of the megaliths as well.

It is to be noted, however, that Brahui in Baluchistan, akin to Tamil, and the Kurukh and Malto languages in Chhota Nagpur and Rajmahal hills, respectively, are said to represent late migrations from the south, the latter two being regarded as importation from the Kannada country with marked analogies to Telugu. With the migration of the languages, some strains of the cultural trait of megalithism would be expected to emigrate as well. This would create fresh complications in the issue, and at the moment the extent of the cultural diffusion through these languages, in so far as it relates to megalithism, is not clearly established.

(f) *Iron and the Megaliths of South India.*—In this context it may be contended that, if the use of iron, which is an integral element of the megalithic culture, developed, independently, earlier in the south than in the north, it would scarcely have been possible, on the assumption that *circa* 300 B.C., is the earliest date of megaliths as of iron, for Asoka to have set his foot on the southern soil. But on the contrary not only did Asoka set his foot there, but he put his decisive stamp upon it, lasting through the mists of history. He further maintained good neighbourly relations with four established kingdoms of the south. This would have been possible more as a result of his possession of a superior strength, resting on an adequate reserve of competent arms, not to be employed for harassment but ready to be flashed out in defence against aggression and less by a mere empty abjuration of wars and honest liquidation of normal defences. In those days they should have comprised arms of iron or possibly steel imparting a superiority of strength that inspired fear and commanded respect.

If the carriers of the megalithic concept did not have any substantial knowledge of iron prior to their ultimate penetration into south India, they could at least have picked up its rudiments on the way to the south, possibly from the Aryan

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tribes themselves, pushing further on into the south, as they did, and establishing an extensive Iron Age culture in all its ramifications. They then utilized the immense deposits of ores in south India to produce their miscellany of weapons and agricultural tools.

If, on the contrary, they had acquired the knowledge of iron prior to the contemporary Aryan tribes it would surely have given rise to a trial of strength between the two. The obvious superiority of iron weapons and its earlier possession would normally have tilted the balance in favour of the iron-using megalithic folk, and they would be under no obligation to be confined to the peninsular south. This was not apparently the case. But as iron forms an integral element of the southern megalithic culture, it is likely that the bearers of the megalithic tradition had obtained their knowledge of iron partly from the cairns of Baluchistan and Makran and partly from the northern plains.

If, therefore, the tradition bearers of the megalithic cult had already acquired the knowledge of iron and yet, in fact, they moved down to the south, the circumstances must be set down to the superiority of their northern compatriots and a timely realization on the part of the former of the utter futility of any trial of strength with superior forces. Practical experience, maybe on small scales, should have been another guide in this decision of wisdom. The admission of such a possibility implies an adequately earlier development of the Iron Age technology in the northern parts of India. But, in fact, no trial of strength by an appeal to arms is indicated by evidence, nor was there any need for it as the mutual relationship between the pressed bearers of the Dravidian traditions and the expanding Aryan speaking juggernaut appears on the whole to have been one of tolerance, and to an extent, even of amity, such as a strong fellow-traveller can evince towards the not so strong.

(h) *Summary of the Arguments.*—Wheeler's analysis of the megalith problem traces (i) its black-and-red ware to the dying phase of the chalcolithic culture, (ii) iron to the northern plains, and (iii) the megalithic burial complex to an unknown source, possibly lying outside India, in the west.

There is no dispute about the first premise, except about its chronological assessment.

The second can be accepted, limitedly, in so far as it relates to iron, though not again, with its chronological bounds suggested by him. About the N.B.P. Ware sharing, even initially, the plaudits of the suggested cultural conquest as indicated by

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him, over the megalithic culture, resulting in the development of the black-slipped ware of the megaliths, one cannot be over-enthusiastic. Is it not surprising to see that this *de luxe* Ware did not live beyond the second century B.C., and was not able to penetrate beyond Amaravati in the Krishna valley? The reason is perhaps not far to seek. By this time the megalithic ceramic was evolved, improved and matured enough not to be enticed by the dying intruder to fall for its fading lustre. Even its distribution in the megalithic zone does no honour to its dignity. In fact, it is so sparse in the south as to attribute its presence to an accident of importation rather than to the deliberate effort of local manufacture.

It has already been shown that though iron objects and the N.B.P. Ware went hand in hand, iron was earlier in point of emergence in the northern plains. About tracing the iron of the megaliths exclusively to the Ganga plain, even at an earlier date, one cannot be very sure either.

Wheeler has no present answer for the third aspect, namely, the source of megalithism in India, except a near-guess. An attempt has been made to answer the third question also in the foregoing lines. The integrated solution of the problem has resulted in a modification of the old time-table, almost beyond recognition.

Conclusion

The convergence of all the available evidence in hand leads to the following conclusions regarding the megalith-builders:—

(a) The megalith-builders penetrated into the south considerably before the Mauryan invasion.

(b) They had a reasonable chance of picking up acquaintance with iron either from their Aryan compatriots or from the cairn-burial folk.

(c) They imbibed and continued the ceramic tradition of the chalcolithic culture, of an end-phase or even a post-chalcolithic phase. Such a phase is indicated by Period II at Nagda, where the chalcolithic tradition continues. Though at Nagda Period II occurs after a hiatus, separating it from the earlier chalcolithic culture, the possibility of its survival through an overlap is not ruled out. To quote a parallel case, the Painted Grey Ware and the N.B.P. Ware are separated by a hiatus at Hastinapura, but at Sravasti, further east, they occur together in an overlap, obviously at a later date. This evidence has been confirmed by the recent excavations at Ahichchhatra.

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Nagda II represents a continuity of some of the chalcolithic traditions even after the introduction of iron technology, though in a modified form. At a corresponding period, Ujjain, one of the most important settlements in the region, shows an Iron Age urban culture, not entirely impervious to the surviving chalcolithic tradition, though in its attenuated form.

(d) They appear to have imbibed and incorporated some aspects of the burial customs of the chalcolithic folk as well. Burial customs have a tendency to persist; and absence of evidence of survivals in the post-chalcolithic phase cannot strictly be used as a negative argument to exclude their contact with the megalith-builders, even in a phase of overlap with the succeeding Iron Age culture. Ghosh's discovery of rare remains of post-cremation burials at Rajgir in clay-lined pits[193] provide a parallel example of continued survival possibly from an earlier date.

(e) The chronological extent of the cairn-burials, taking its initial date back to *circa* 800 B.C., accords well with the end-phase of the chalcolithic culture extending upto *circa* 800 B.C., as well as with the suceeding Iron Age culture at Nagda and Ujjain, namely, *circa* 750 B.C., and sets the possible lower limits, in harmony with the attendant evidence, for the introduction of the megalithic cult into India. The time factor involved in its southward movement may account for a hundred years, and point to the date of its introduction there around 700 B.C.

If, however, an independent origin of megaliths in south India is to be posed, it is to be traced hypothetically as an isolated development of an advanced culture on the expiry of a primitive crop farming culture of neolith-users, as archaeology has revealed, and it has, of course, to be attributed to the Dravidian speakers. Even this would presuppose a long time gap before the advent of the Mauryas on the field, as shown above. A full-fledged Iron Age culture is also to be conceded from the very beginning, as a non-iron megalithic culture in the south, representing, if at all, a possible earlier development-phase, is yet to be discovered.

All this would point to a palpable improbability of such a course of megalithic evolution in south India.

The corresponding chronology of the Painted Grey Ware, the post-chalcolithic-cum-pre-N. B. P. culture as in Nagda and limitedly at Ujjain, as of the cairn-burials lend support conjointly to the chronological scheme suggested for the megaliths in south India and impart, at the least, a semblance of admissibility to the theory of the introduction of megaliths into India including the incorporation of iron as advocated above.

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It is, therefore, obvious that there was knowledge of iron both among the cairn-burial folks on the Irano-Pakistan borderlands on the one hand and the users of the Painted Grey Ware ceramic in the northern plains on the other almost about the same time. It cannot, however, be maintained that the two people had any cultural contact or exercised mutual influence, though the iron of both the groups can indeed be traced in common to Sialk VI B, which again is easily attributed to chain reactions which had engineered and directed the movement of the Aryan speaking peoples eastwards into Iran and further still into the Indo-Pakistan subcontinent (see Chapter 5, pp. 118-19 and 125-26).

B. B. Lal, in the course of his lectures after his recent Nubian expedition, has pointed out some similarities in megalithic practices between south India and Nubia in the form of (a) identical construction of enclosing rubble walls as in Brahmagiri (Mysore), (b) folded interment as in Maski (Mysore State), (c) similarity of shapes in bowls and hollow stands in general, and (d) the general occurrence of black-and-red ware. This evidence, however, does not help forge a conclusion, for the intermediate land-masses remain to be examined for traces of similar monuments. The chronological gap between Nubia and south India is another baffling factor. The other divergent elements need not be discounted at this stage. Nevertheless, there is evidence for a cultural connexion between the two widely separated regions, and further research is awaited for a positive inference[194].

NOTES AND REFERENCES

1. G. R. Sharma, Excavations at Kausambi, *An. Bibl. Ind. Arch.*, Kern Institute, Vol. XVI, for 1948-53, Leyden, pp. XXXVII-XXXIX.

2. K. Deva and Wheeler, Appendix A on Northern Black Polished Ware, *A.I.*, no. 1, pp. 55-6, wherein a date between the 5th century B.C. and the beginning of the 2nd century B.C. has been assigned to this ware. See chapter 14.

3. Lal, *op. cit.*, p. 23.

4. *Ibid.*, pp. 150-1.

5. *I.A.*, 1953-54, p. 6; 1954-55, p. 9.

6. A Ghosh, Rajputana Desert—its archaeological aspect, *Bull. Nat. Inst. Sciences Ind.*, no. 1, 1952, pp. 37-42.

7. *I.A.*, 1956-57, pp. 20-28; 1957-58, pp. 32, 34 & 36; N. R. Banerjee, *op. cit.*, pp. 74-86.

8. The deposits of Period I at Ujjain cover approximately a total thickness of 7 ft. (213 cm.) distributed in ten layers. A period of from 250 years to 300 years for these strata to accumulate would seem a reasonable estimation.

9. The author experienced difficulties in the course of conducting the excavations through the virgin deposits, when the tools, blunted by the impact, had to

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be sharpened at frequent intervals. The rather loosened deposits used in raising the mud fortification had also some degree of hardness, being only a little less difficult to dig through.

10. The analysis and report were prepared by the late S. S. Ghosh, Wood Anatomist, Forest Research Institute, Dehradun. The author owes a profound debt of gratitude to that scholar, who had taken up the study of the wood remains in view of their special significance, having visited the site himself early in the summer of 1958.

11. E. Hultzsch, *Corp. Ins. Ind.*, I, p. 92 ff.

12. Translation by W. H. Schoff, Section 48.

13. Senart, *Ep. Ind.*, VIII, pp. 60 ff.

14. Kielhorn, *Ep. Ind.*, VIII, pp. 42 ff.

15. The arguments for and against the proposed identification have been discussed at length by H. D. Sankalia in the report on the *Excavations at Maheshwar and Navdatoli*, 1952-53, Poona-Baroda, 1958, pp. 1-15, and the identification can now be said to be established beyond any reasonable measure of doubt.

16. Malalasekhara, *Dictionary of the Pali Proper Names*, II, p. 344.

17. H. C. Raychaudhuri, *P.H.A.I.*, 6th edition, 1953, p. 491.

18. D. C. Sircar has suggested to the author that '*Pūrvāpara* may really mean country from east to west'. He has further stated that "*Ākara-Veṇ-Āvantaka* in the *Brihatsaṁhitā*, 14, 12, seems to show that *Ākara* was a separate country".

19. *The Periplus, op. cit.*, sec. 48.

20. N. R. Banerjee, The technique of the manufacture of stone beads in ancient Ujjain, *J.A.S.*, Vol. I, No. 2, 1959, pp. 189-196.

21. M. K. Raychowdhury, *Bull, Geol. Surv. Ind.*, no. 10, p. 37.

22. *Ibid.*, p. 53.

23. A sample of the material was analyzed and examined by Dr. B. B. Lal, Archaeological Chemist in India of the Archaeological Survey of India, Dehradun, and found to be aragonite, mainly on the ground of its hardness. Calcite and aragonite often co-exist as a mixture and as aragonite is unstable it changes into calcite; see E. S. Dana, *Text Book of Mineralogy*, 1955, pp. 513, 521-522. Irrespective of its being aragonite or calcite, the material concerned, a variety of limestone, could have served only as a flux in the smelting of iron ores at Ujjain.

24. R. J. Forbes, *Metallurgy in Antiquity*, Leyden, 1950, pp. 396, 399; H. H. Coghlan, *Notes on Prehistoric and Early Iron in the Old World*, Pitt Rivers Museum, University of Oxford, 1956, pp. 40-41.

25. *Ep. Ind.*, XXIII, p. 102; *Bombay Gazetteer*, Gujarat, p. 540.

26. Information from Shri V. S. Wakankar of Ujjain.

27. N. L. Dey, *The Geographical Dictionary of Ancient and Medieval India*, 1927, p. 48.

28. *Ibid.*, p. 30.

29. *Ibid.*, p. 196.

30. Pargiter, *A.I.H.T.*, pp. 259-260.

31. *Ibid.*, p. 266.

32. *Ibid.*, p. 267; Raychaudhuri, *op. cit.*, pp. 145-146.

33. Pargiter, *D.K.A.*, p. 18; Raychaudhuri, *op. cit.*, pp. 145-146.

34. Raychaudhuri, *op. cit.*, p. 95.

35. *Ibid.*, p. 206.

36. *S.B.E.*, XVII, p. 187.

37. Pargiter, *op. cit.*, p. 267.

38. *Ann. Bhand. Inst.*, 1920-21, p. 3; Malalasekhara, *op. cit.*, I, p. 128; Raychaudhuri, *op. cit.*, p. 205.

39. Raychaudhuri, *op. cit.*, p. 206.

40. R. K. Mukherjee, in *The Age of Imperial Unity, The History and Culture*

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of the Indian People, 1953, p. 588. Tradition and Buddhist literature record the dedication of a monastery by Jīvaka, the court physician, at Rajgir (see B.C. Law, *Rajagriha in Ancient Literature, M.A.S.I.,* no. 58, pp. 8, 9 & 12). That the Buddha himself dwelt here for a while is recorded in *Digha Nikāya,* II, pp. 116-17.

41. The monastery called *Jīvakāmravana vihāra* at Rajgir, known to have been dedicated by Jīvaka to the Buddha, has since been exposed by the recent excavations at Rajgir, seeking to establish at once the truth of the tradition and literary accounts, and, more significantly, the tremendous contemporaneity of the Buddha with Pradyota, Bimbisāra, Ajātaśatru and, of course, Jīvaka. See *I.A.,* 1953-54, p. 9; 1954-55, pp. 16-17.

42. Raychaudhuri, *op. cit.,* p. 202.

43. *Ibid.,* pp. 147, 204, 227-228.

44. H. C. Tolman, *Ancient Persian Lexicon and the Texts of the Achaemenid Inscriptions;* Rapson, *Ancient India,* p. 81; E. Herzfeld, *M.A.S.I.,* no. 34, pp. 1 ff.; Raychaudhuri, *op. cit.,* p. 240.

45. *Majjhima Nikāya,* III, 7; Law *op. cit.,* p. 24.

46. Law, *Ujjayini in Ancient India,* Gwalior, 1944, p. 13.

47. Pargiter, *D.K.A.,* p. 38, note 21.

48. Law, *op. cit.,* p. 14.

49. A. Ghosh, Rajgir, 1950, *A.I.,* no. 7, 1951, p. 69, *I.A.,* 1953-54, p. 9; 1954-55, pp. 16-17.

50. Law, *Rajagriha in Ancient Literature, M.A.S.I.,* no. 58, pp. 25-26; Pargiter, *A.I.H.T.,* pp. 118, 282; *D.K.A.,* pp. 67-68.

51. G. R. Sharma, *op. cit.; The Excavations at Kausambi,* 1957-59; *I.A.,* 1953-54 onwards.

52. G. R. Sharma, *The Excavations at Kausambi,* 1957-59, Allahabad, 1960, pp. 15-16. That Kausambi was invaded and conquered by the Hūṇas under Toramāna (*circa* 510-515 A.D.) is established by the debris of vandalism found in the excavations as well as by the find of two seals bearing, respectively, the legends '*TO RA MĀ NA*' and '*HŪNA-RĀJA*' against the background of the general trouble caused by the Hūṇas, who were first defeated by Skandagupta before 457 A.D. (Bhitari Stone Pillar Inscription, *Ep. Ind.,* III, pp. 53 ff.) and again by Yaśodharman of Mandasor, who ruled between *circa* 525 and 535 A.D. (Mandasor Pillar Inscription of Yaśodharman, *Corp. Ins. Ind.,* III, pp. 146 ff.; Kielhorn, *Ind. Ant.,* XVIII, pp. 219 ff.).

53. Law, *Kausambi in Ancient Literature, M.A.S.I.,* no. 60, 1939, pp. 17 ff.

54. G. R. Sharma, Excavations at Kausambi, *An. Bibl. Ind. Arch., Kern Inst.,* 1948-53, p. XLI.

55. Law, *op. cit.,* p. 20; Samuel Beal, *Siyuki, Buddhist Records of the Western World,* Vol. I, 1906, p. 236.

56. *I.A.,* 1955-56, p. 20.

57. *Ibid.,*

58. H. A. Giles, *The Travels of Fahien,* (second impression), London, 1956, pp. 61-62.

59. Beal, *op. cit.,* p. 20.

60. Besides containing the Edicts I-VI, this pillar also contains one inscription of a gift by the queen, Kāruvakī, who was the mother of Tivara, and a special Kausambi Edict on the punishment of those who fomented and fostered schism in the Buddhist order, besides the later inscription of Samudragupta giving an account of his *digvijaya* (campaign of universal conquest).

61. G. R. Sharma, *An. Bibl. Ind. Arch. Kern Inst.,* 1948-53, pp. XLIV-XLV. The occurrence of the name, *Ghoshitārāma-mahāvihāra.* in some of the inscrip-

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tions, including a seal, leaves no room for doubt regarding the proferred identification.

62. Foucaux, *Translation of the Tibetan version of Lalitavistara;* W. W. Rockhill, *The Life of the Buddha,* pp. 16-17; Law, *op. cit.,* p. 11.

63. A. Cunningham, *The Bhilsa Topes,* London, 1853, pp. 297 ff.

64. *I.A.,* 1960-61, pp. 33-34.

65. Law, *op. cit.,* (Kausambi), pp. 13-16.

66. Pargiter, *D.K.A.,* p. 5; The lines quoted by Pargiter as contained in the *Matsya Purāṇa* read:

Adhisīmakṛishṇa-putro Nichakshur
bhavitā nṛipaḥ
Gaṅgayāpahṛite tasmin nagare
nāgasāhvaye
Tyaktvā Nichakshurnagaraṁ
Kauśāmbyāṁ Nivatsyati

But the *Vishṇu Purāṇa* replaces the words *'tasmin nagare'* with *Hastināpure* Pargiter, *Ibid.,* pp. 65, 66, translates the text thus: "Adhisīmakṛishṇa's son will be King Nichakshu. When the city of Hastinapura is carried away by the Ganges, Nichakshu will abandon it and will dwell in Kausambi".

67. Lal, *op. cit.,* pp. 14-15, pl. VI.

68. Pargiter, *A.I.H.T.,* pp. 179-183.

69. Pargiter, *D.K.A.,* p. 25; Mahāpadma is described as *Sarva-Kshatrāntaka.*

70. Notwithstanding the divergent numbers of the kings, Pargiter has shown that it would be fair to count 26 kings in the Paurava dynasty. See *A.I.H.T.,* p. 181.

71. *Ibid.,* pp. 181-182. Strictly speaking the period would work out to 26 × 18 = 468 years. The addition of this figure to 402 (B.C.) would bring the date to 870 B.C.

72. *D.K.A.,* p. 58, quotes the two versions in the following words:

"Mahāpadmābhishekāttu yāvajjan-
ma parikshitaḥ evaṁ varsha
sahasraṁ tu jñeyaṁ", and
Yāvat Parikshito janma
Yāvan Nandābhishechanaṁ jñeyaṁ
Pañchaśad-uttaraṁ or *Pañchaśadottaraṁ*

The last words relating to the lapse of years before the Nandas are translated as either 1050 or 1015 years. See also *A.I.H.T.,* p. 180.

73. Raychaudhuri, *op. cit.,* p. 36.

74. Lal, *op. cit.,* p. 149.

75. Pargiter, *op. cit.,* p. 285.

76. *Ibid.,* p. 285; *D.K.A.,* pp. 5, 65.

77. Raychaudhuri, *op. cit.,* pp. 202-3.

78. Wheeler, *op. cit.,* pp. 26-31.

79. *Ibid.,* p. 31.

80. *Ibid.,* p. 31.

81. Gordon, The Pottery Industries of the Indo-Iranian Border, *A.I.,* nos. 10 & 11, p. 175.

82. Gordon, *The Prehistoric Background of the Indian Culture,* Bombay, p. 152.

83. Wheeler, *A.I.,* no. 4, 1947-48; *op. cit.,* p. 202.

84. Sankalia, Subbarao and Deo, *The Excavations at Maheshwar-Navdatoli,* Poona-Baroda, 1958, p. 249.

85. Krishnaswami, The Neolithic Pattern of India, Presidential Address, Sec-

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tion of Anthropology and Archaeology, presented to the Indian Science Congress, Delhi, 1959, published in *A.I.*, no. 16, pp. 25 ff.

86. *I.A.*, 1958-59, p. 15.

87. Sankalia, Subbarao and Deo, *op. cit.*, *Addendum* between pages xii and xiii.

88. Sankalia, *Illustrated London News*, 5th September, 1959, pp. 182-183.

89. H. T. Waterbolk, 'The 1949 carbon 14 symposium at Groningen', *Antiquity*, XXXIV, 1960; Henrik Tauber, *Difficulties in the application of C.14 results in archaeology*, lecture delivered at the V Internationaler Kongress fuer Vor-und-Fruehgeschichte, Hamburg, 1958, *Archaeologia Austriaca Franz Deuticke*, Wien (Vienna) 24/1958, pp. 59-69.

90. *I.A.*, 1958-59, p. 31.

91. *Ibid.*, 1957-58, p. 32.

92. Sankalia, *op. cit.*, p. 248.

93. Sankalia, *op. cit.*, p. 248.

94. Wheeler, *A.I.*, no. 4, 1947-48, pp. 200-202 & 300.

95. India number of *Man*, 1930, No. 134, p. 172.

96. Alexander Rea, Excavations at Amaravati, *An. Rep. Arch. Surv. Ind., 1908-09*, Calcutta, 1912, pp. 88-91.

97. N. R. Banerjee, The excavations at Sengamedu, *March of India*, June 1956, pp. 43-46.

98. Wheeler, *op. cit.*, pp. 199-202.

99. K. V. Soundara Rajan, Studies in the Stone Age of Nagarjunakonda and its neighbourhood, *A.I.*, no. 14, 1958, p. 111.

100. B. K. Thapar, Maski, 1954: a chalcolithic site of the southern Deccan, *A.I.*, no. 13, 1957, pp. 11, 13.

101. It is dated to *circa* 600 A.D. in the *University of Ceylon Review*, Vol. VI, 1948, p. 105; S. Vaiyyapuri Pillai in *History of Tamil Language and Literature*, pp. 81, 147, 152, dated it to *circa* 800 A.D.

102. *Maṇimekalai*, ch. 6, 11, 66-67; see also K. R. Srinivasan, The Megalithic burials and urnfields of south India, *A.I.*, no. 2, p. 12.

103. K. R. Srinivasan, *op. cit.*, p. 9.

104. Wheeler, *op. cit.*, p. 202.

105. The question of the chronology of the neolithic-chalcolithic culture has been dealt with at length by several scholars in recent years: Thapar, *op. cit.*, (Maski), was content with the date-scheme earlier suggested by Wheeler. H. D. Sankalia, and S. B. Deo suggested in their *Excavations at Nasik and Jorwe*, Poona, 1955, a still earlier date-scheme, 1500-1000 B.C., and followed it up in their preliminary report on the excavations at Maheshwar-Navdatoli, 1958, wherein they suggested the same date.

Sankalia further suggested this date in the report on the excavations at Nevasa, in *From History to Prehistory*, 1960, p. 68, and, as earlier stated, in the *Illustrated London News*, 5th September, 1959, p. 182, and *A.I.*, 1958-59, p. 31, and lastly, Sankalia in his work on *Indian Archaeology Today*, 1962, p. 19, has suggested the date-range of *circa* 1700-1100 B.C. The present author has discussed this question in chapter 3 and has indicated that the culture is post-Harappan in stratigraphy and datable to between *circa* 1500 and 800 B.C. in general.

106. Wheeler, *op. cit.*, p. 202.

107. For a discussion of the question, see Wheeler, Brahmagiri and Chandravalli 1947, *A.I.*, no. 4, Appendix D. pp. 300-305, and V. G. Childe, the Megaliths, *A. I.*, no. 4, pp. 12-13.

108. Sir Aurel Stein, *Archaeological Reconnaissances in North-Western India and South-Eastern Iran*, London, 1937; *M.A.S.I.*, nos. 37 and 43.

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109. Mockler, 'On Ruins in Makran', *J.R.A.S.*, 1877, pp. 121 ff.
110. Information from Shri B. K. Thapar.
111. Aurel Stein, in *Archeological Reconnaissances in North-Western India and South-Eastern Iran*, p. 74, describes the phenomenon in the following words, "Frequently one of the side walls shows a small opening similarly roofed over and intended to represent an entrance". This is also confirmed in *M.A.S.I.*, no. 43, p. 78, where Stein refers to Major Mockler's description of a door to the enclosures in *J.R.A.S.*, 1877, pp. 122 and 132.
112. V. D. Krishnaswami and N. R. Banerjee in a paper (not published) on the Megalithic Monuments of the Chingleput District, presented to the 1948 (Patna) session of the Indian Science Congress, Anthropology and Archaeology Section.
113. Wheeler, *op. cit.*, p. 187.
114. Diodorous, *Bibliotheca*, XVII, cv; trans. by McCrindle, *Invasion of India*, p. 297; also see Stein, *M.A.S.I.*, no. 43, p. 82.
115. Stein, *M.A.S.I.*, no. 37, pp. 45, 47.
116. Stein, *Ibid.*, pp. 47, 48.
117. D. H. Gordon, *The Prehistoric Background of Indian Culture*, 1958, p. 156; The Pottery Industries of the Indo-Iranian Border: A Restatement and Tentative chronology, *A.I.*, nos. 10 and 11, p. 172.
118. Beatrice de Cardi, A new prehistoric ware from Baluchistan, *Iraq*, Vol. XIII, Part 2, 1951, pp. 63 ff. The connected discussion of the Londo ware presented here is based on the above-named paper as well as on a discussion with Miss De Cardi herself.
119. *Ibid.*, p. 71.
120. *Ibid.*, p. 71.
121. *Ibid.*, p. 72.
122. D. H. Gordon, *op. cit.*, pp. 172, 174; *The Prehistoric Background of Indian Culture*, pp. 156-161.
123. Gordon, *A.I.*, nos. 10 and 11, p. 174; *The Prehistoric Background etc.* p. 160.
124. Stein, *M.A.S.I.*, no. 43, p. 77.
125. C.F.A. Schaeffer, *Stratigraphie Comparée et Chronologie de l'Asie Occidentale*, pp. 404 ff.
126. *Ibid.*, pp. 404 ff.
127. *Ibid.*, p. 438.
128. *Ibid.*, p. 439.
129. *Ibid.*, pp. 406-414.
130. *Ibid.*, pp. 427-438.
131. *Ibid.*, pp. 559-561.
132. See fig. 255 (26) of *Stratigraphie Comparée etc.* It is pertinent to quote the words of Schaeffer from *Stratigraphie Comparée*, p. 472, "*Mais, il ne faut pas oublier que les trouvailles de Sialk VI B, comme toutes celles du Luristan et du Nihavend, montrent que l'elevages des chevaux etait la preoccupation et la principle resource de cette civilisation*". It simply means that it should not be forgotten that the finds of Sialk VI B as all those from Luristan and Nihavend show that the raising of horses was at once the principal preoccupation and resource of this civilization.
133. *Ibid.*, p. 472, fig. 255 (26).
134. Stein, *M.A.S.I.*, no. 43, p. 88.
135. Gordon, *op. cit.*, p. 174.
136. Schaeffer, *op. cit.*, p. 472.
137. Childe, *A.I.*, no. 4, pp. 12-13.
138. *J. Bom. Br. R.A.S.*, V (1857), 353 ff.; also H. Cousens, The Antiquities of Sind, *Arch. Surv. Ind. Imp. Ser.*, XLVI (1929), pp. 44-5.

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139. *Ibid.*, p. 349.

140. *Arch. Surv. Ind. An. Rep.*, I, for 1862-65, Simla, 1871, Introduction, p. XXX.

141. Wheeler, *op. cit.*, p. 302.

142. *Arch. Surv. Ind. An. Rep.* VI, for 1871-73, pp. 104 ff.

143. *Ibid.*, p. 14; whence Wheeler *op. cit.*, p. 302, foot note No. 2.

144. Carlleyle, *Report of a tour in Eastern Rajputana*, pp. 13-15, 33-39: Gordon, *The Prehistoric Background etc.* p. 161.

145. W. J. Henwood in the *Edinburgh New Philosophical Journal*, N. S., Edinburgh, 1856, pp. 204-5.

146. Carlleyle, *op. cit.*, whence Gordon, *Ibid.*, p. 161.

147. H. de Terra, Excavations at Burjhama, *Miscellanea of the Amer. Phil. Soc.*, 1936, *I.A.*, 1960-61.

148. A. H. Francke in *Arch. Surv. Ind. An. Rep.* 1909-10, pp. 104 ff.

149. D. H. Gordon, *Jour. Ind. Anthrop. Ins.*, New Series, I, p. 18, Calcutta, 1945.

150. R. Heine-Geldern, *Das Megalith Problem, Beitraege Oesterreichs zur Erforschung der Vergangenheit und Kulturgeschichte der Menschheit* — Symposion, 1958, under the auspices of Wenner-Gren Foundation, New York, 1959, p. 179.

151. Christoph von Fuerer-Haimendorf, Megalithic ritual among Gadabas and Bondos, *J.A.S.B.*, Vol. IX, 1943, gives a general account of tribal practices of the megalithic cult besides the details of the rituals of the Bondos and Gadabas.

152. R. Heine-Geldern, *op. cit.*, p. 179.

153. A. H. Dani, *Prehistory and Protohistory of Eastern India*, p. 41.

154. *Ibid.*, p. 101.

155. *Ibid.*, p. 102.

156. E. Thurston, *Castes and Tribes of Southern India*, Vols. IV and VII.

157. N. R. Banerjee and K. V. Soundara Rajan, Sanur 1950 and 52, *A.I.*, no. 15, p. 37 and notes 1 and 2.

158. J. H. Hutton, *Angami Nagas*, London, 1921, p. 23, pl. facing p. 41 and fig. 7; Naga chank ornaments of south Indian affinities, *Man*, Dec. 1926, pp. 222-24.

159. Gordon, '*The Prehistoric Background etc.*' p. 18.

160. Wheeler, *Rome Beyond the Imperial Frontiers*, London, 1954, pp. 126-30; *Early India and Pakistan*, p. 168; Gordon, *op. cit.*, p. 181.

161. Wheeler, *Early India and Pakistan*, p. 168.

162. Childe, Megaliths, *A.I.*, no. 4, pp. 10-13.

163. Heine-Geldern, *op. cit.*

164. *Arch. Surv. Ind. An. Rep.*, 1909-10, pp. 104.

165. See Macdonell and Keith, *Vedic Index*, Vol. I, pp. 8, 9.

The *Ṛigveda* recognizes both burial, *anagnidagdhā* (*Ṛigveda X*, 15, 14), and cremation, *agnidagdhā* (*Ṛigveda*, *op. cit.*). Burial, however, receives a fairly elaborate treatment, being dealt with in a whole hymn (*Ṛigveda X*, 18, 1-14). Of special interest is the setting up of a stone to serve as a barrier between the dead and the living. *Ṛigveda X*, 18, 4, which reads as follows, relates to stones recalling the stone circles of megaliths:

Imaṁ Jīvebhyaḥ paridhiṁ
dadhāmi maisaṁ nu gādaparo
arthametaṁ
Śataṁ jīvantu śaradaḥ puruchī
rantarmṛityuṁ dadhatāṁ
parvatena

It means (see Wilson, *The Rigveda*, Vol. VI, p. 28), "I erect this circle (of stones) for the protection of the living, that none other than of them may

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approach this limit; may they live a hundred years, occupied by many holy works, and keep death hidden by this mound".

The allusion to an earthen house (*mṛiṅmayaṁ gṛihaṁ*) in the *Ṛigveda* may possibly stand for a pit-burial. In this connexion, the invocation in *Ṛigveda* X, 18, 11, to earth appeals to mother earth to rise up above him (to enclose him), not to oppress him, to provide him comfort with attention and to cover him as a mother covers her child with the skirt of her garment. The funeral hymns of the *Vājasaneyi Saṁhitā* contemplate the burning of the body, but burial of the ashes of the mortal remains in the burning ground (*Śmaśāna*) is mentioned (*Atharvaveda*, V, 31, 8; X, 1, 18; *Taittiriya Śaṁhitā*, V, 2, 8, 5; 4, 11, 3). *Atharvaveda*, XVIII, 2, 25 refers also to a coffin.

Thus both burial of sorts and cremation were known to the *Ṛigveda*, though from the paucity of finds of burials and the preference for cremation it may be stated broadly that cremation seems to have come to stay, early enough. From the erection of a circle of stones, or a block of stone, an earthen house (or pit), and the practice of the exposure prevalent in the days of the *Atharvaveda*, it may be stated that the megalithic ritual was perhaps not unknown to the *Ṛigvedic* people. This provides another link of the *Ṛigvedic* Aryans with Sialk VI B.

166. P. V. Kane, *History of Dharmasastra*, Vol. IV, 1953, pp. 246 ff.

167. Walter Ruben, Eisenschmiede und Daemonen in Indien, *Internationales Archiv fuer Ethnographie*, Band XXXVII, Supplement, Leyden 1939, pp. 154-158; also see C. von Fuerer-Haimendorf, *I.R.A.S.*, Vol. IX, 1943, p. 178 n.

168. Gordon, *op. cit.*, p. 161.

169. Wheeler, *op. cit.*, p. 167.

170. *I.A.*, 1956-57, pp. 17-18.

171. *Ibid.*, p. 18; B. Subbarao, *Personality of India*, 2nd Edition, 1958, pp. 173 ff.

172. *I.A.*, 1956-57, p. 18.

173. *I.A.*, 1958-59, p. 18.

174. H. D. Sankalia and others, *From History to Prehistory at Nevasa*, 1960, pp. 23, ff., 500 ff; I.A., 1955-56, p. 8.

175. Wheeler, Brahmagiri and Chandravalli, 1947 etc., *A.I.*, no. 4, pp. 202-203.

176. B. K. Thapar, Maski 1954, *A.I.*, no. 13, pp. 27 ff.

177. *Ibid.*, p. 27; see also *I.A.*, 1955-56, p. 8. The use of line for plastering floors were observed at Nevasa and Daimabad (see *I.A.*, 1955-56, p. 8 and *I.A.*, 1958-59, p. 18).

178. Wheeler, *A.I.*, no. 4, pp. 200-202.

179. Haimendorf, New aspects of the Dravidian Problem, *Tamil Culture*, II, No. 2, 1953, *Indo-Asian Culture*, II, No. 3, Jan. 1954, pp. 238 ff.

180. Wheeler, *Early India and Pakistan*, p. 163.

181. *Ibid.*, p. 164.

182. *Rājāvalikathe*, *Ind. Ant.*, 1882, p. 157, whence H. C. Raychaudhuri, *P.H.A.I.*, Cal. 1953, 6th Edition, pp. 294-295.

183. These names occur in the second Rock Edict. See Hultzsch, *Corp. Ins. Ind.*, Vol. I, pp. 2 ff. They are referred to generally as *Rājāno* (kings).

184. *Journal Asiatique*, Tome CCXLLVI, 1958, pp. 1-48; *East and West*, Vol. 9, 1958, pp. 192 ff. and Vol. 10, 1959, pp. 243 ff., whence H. D. Sankalia, *Indian Archaeology Today*, 1962, pp. 109-110.

185. The language used in these inscriptions was, however, Prakrit.

186. Haimendorf, *op. cit.*, pp. 238 ff.

187. T. Burrow, *The Sanskrit Language*, London, p. 387.

188. N. R. Banerjee, Megalith-builders of south India were Dravidian spea-

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kers—A Review, *Silver Jubilee Volume, The Archaeological Society of South India,* Madras, June, 1962, pp. 180 ff.

189. S. S. Sarkar, Human Skeletal Remains from Brahmagiri, *Bulletin of the Department of Anthropology,* Vol. IX, No. 1, pp. 5-25.

Sarkar has brought out the similitude between Brahmagiri skulls and the majority of skulls in Sialk VI, (p. 23). To quote him, "its (Sialk VI's) *brachycephaly may be responsible for the brachycephaly of Brahmagiri*". While emphasizing the brachycranial (represented by mesocranial characteristics), he points out the presence of an autochthonous Australoid ethnic entity among the skulls as well. Kappers has pointed out the cephalic index of the Scytho-Iranians, who migrated to Iran from the region of Ukraine between 2000 and 1000 B.C., in *An Introduction to the Anthropology of the Near East,* Amsterdam, 1934, as brachycranial. The parallelism, howsoever limited, does point to a possible source of inspiration.

190. P. Gupta and P. C. Dutta, Human Remains Excavated From Megaliths at Yelleswaram, *Man in India,* Vol. 42, No. 1, 1962, pp. 19 ff.

191. H. Vallois, Les Ossements humains de Sialk, in *Fouilles de Sialk,* II, pp. 113 ff.

192. Burrow, *op. cit.*

193. A. Ghosh, Rajgir 1950, *A.I.*, no. 7, 1951, pp. 69-70; pl. XXIX, fig. 2.

194. B. B. Lal, The only Asian Expedition in threatened Nubia: Work by an Indian Mission at Afyeh and Tumas, *Illustrated London News,* April 20, 1963, pp. 579-581; *Indian Archaeology Since Independence,* 1964, p. 63; *Indian Archaeology 1961-62 — A Review,* pp. 66-70.

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CHAPTER 4

USERS OF THE PAINTED GREY WARE INTRODUCED IRON IN NORTH INDIA

A. General

The earliest occurrence of iron in north India, associated with the Painted Grey Ware, as shown in chapter 2, leads directly to the question as to who these people were and wherefrom they imbibed this new metal and its technology. Wheeler has modified Lal's provisional attribution of the ware to the Aryans by equating the users of the Painted Grey Ware, as a concession, with the second wave of invasion of the Aryans from the Panjab into the Ganga plain.[1] Over the past years more than one cultural *ensemble* have been sought to be claimed as Aryan. They comprise the Harappa civilization at one end of the chronological scale and the Painted Grey Ware at the other, with the people of Cemetery 'H' at Harappa, and the people associated with the 'copper hoards' also being thrown into the competition.

The problem of identifying the Aryans among these divergent claimants is not merely difficult, it is also complicated by the diversity of the claims. One apparently simple standard of judgement is provided by the *Ṛigveda,* substantiated and complemented by the *Vedic* literature in general. It sounds reasonable enough to seek the material remains of the *Vedic* people in the light of their earliest literary lore, but the task is a difficult one and it is as yet a far cry to equate any material remains with the literary accounts of the *Vedas.* Nevertheless, the divergent claims are examined below.

B. Harappa Civilization And The Aryans

(i) *Geographical Extent*

Geographically the extent of the Harappa civilization (fig. 8) has far exceeded the spatial bounds to which it owes its name, and it is expanding to this day by leaps and bounds. The geographical area extends over the regions known to the

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Ṛigveda and beyond, in the region of the subsequent settlement of the Aryans[2]. This, therefore, presents no difficulty, though the possibility of other early cultures spreading over the same region complicates the matter a little. It cannot, therefore, be treated as the sole or even a major criterion for solving the problem.

(ii) *Architecture and Urban Life*

Architecturally, the excavations at Harappa and Mohenjo-daro[3] and more recently at Lothal[4] and Kalibangan[5] have shown the civilization to be largely urban in its evolvement with, no doubt, the backbone lying in small villages. Nevertheless, the urban character of the civilization is basically opposed to the simple pastoral and agricultural life of the *Vedic* peoples divided initially into tribal groups, spreading out independently of one another, though culturally and socially linked quite closely. The urban character of the Harappa civilization is indicated by the well-planned and storeyed houses of bricks, containing many chambers, baths and drains and well-planned streets, undergound and deep sewage ways, connected by gentle but effective gradients with intermittent cesspools, all suggesting even municipal control. The citadel-like defences at Mohenjo-daro and Harappa, built on high platforms to save the enclosed city from floods as well as from extraneous attacks, indicate a controlled administrative machinery. No less are the public buildings, like the Great Bath and Hall at Mohenjo-daro, and granaries and workmen's quarters at Harappa, or the harbour at Lothal indicative of many-sided advance. These reflect an elaboration of material life unknown to the *Ṛigveda.*

(iii) *Religion*

In the matter of the religious life of the Harappa people, surmise, in the absence of aid from the still undeciphered script of the seals, is nearly the only guide. The well-known seal, bearing a *Yogin* with horned heads and a circle of animals, identified by Marshall with Śiva as *Mahāyogin or Rudra* (*Paśupati*)[6] of the *Ṛigveda* dominates the field. It is recognized as the Śiva of the later Indian pantheon. This identification receives a good deal of prop from the numerous phallic symbols[7] and even the prototypes of the *Yoni,* in stone, recognized as objects of worship. But far more prolific are the terracotta figurines in female form with an elaborate head-dress, recognized as objects of worship as the Mother Goddess[8]. The seals also portray a number of bizarre

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animal forms, installed before what looks like an incense burner, and a composite form of man and beast (bovine)[9], recalling the Sumerian Eabani or Enkidu, also included in the pantheon. The method of worship is not known, though a singular male bust, wearing a trefoil-patterned cloth, thrown over the left shoulder, a beard, with the upper lip shaven, a fillet with a disc around the head, covering the forehead, and arm bands, has been identified as a priest[10].

The composite picture presented by this array of deities, godheads and priest recalls some aspects, no doubt, of later day Hindu religious life, but does not reflect the *Vedic* concept of religion[11] comprising Indra, Agni, Varuṇa, Marut, Rudra, Dyaus and Sūrya. Nor is the *Vedic* emphasis on sacrifices[12] indicated.

Recently, however, T. N. Ramachandran, an eminent Sanskrit scholar, has brought out several parallelisms between *Ṛigvedic* passages and the picture conjured up by some of the seals[13]. The Paśupati seal, in particular, is stated to be no other than the embodiment of the *Mahisha*[14] as well as Mahodeva mentioned in the *Ṛigveda* (VI, 48, 4), according to him. The mention of the Śishṇadeva[15] in the *Ṛigveda* recalls to him the phallic emblems and the little nude figure of a male, with the phallus damaged, in sandstone, found at Harappa[16]. Of course, Śishṇadevas are not looked upon with favour, but, no doubt, the contemporaneous existence of this cult among a section of the people is clearly indicated. Nor was Paśupati looked upon with favour. The figure identified as priest is actually interpreted to be a '*Yajamāna*', the person intending to sacrifice, pointing to an implied ritual of sacrifice.

Besides these, the tall and perforated cylindrical vessels[17] are likened to vessels called *Sahasradhāra* or thousand-streamed, and were obviously meant for crushing *soma* plants inside, allowing the juice to flow out in numerous streams. The little clay-carts are not to be taken as play-things, but as the very vehicles employed to carry *Soma* plants to the altar or platform of sacrifice.

A seal bearing three heads emanating from the shoulder of an animal, a bull,[18] seems to provide another parallel yet. One of its heads is twisted backward, the central one is erect and the third one is projected towards the fore. Ramachandran reads in them the call of the past, present and future, respectively, paralleled in a *Ṛigvedic passage.*

Besides these, there are several other similarities noted by Ramachandran.

The revolutionary interpretation, if aided a little by imagination, strikes very persuasively indeed, but has not yet carried

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conviction. These parallelisms do not connect all or even the major aspects of the life of either the Harappans or of the *Ṛigvedic* Aryans. The context of the passages is not yet clear and the factor of accident, in view of the very limited scope of similarities, cannot be altogether forgotten. Is there anything to prevent echoes of life in the past from occurring in later records, on the assumption that the interpretation fits the facts? Heinrich Zimmer[19] has traced many an iconic form of later Hinduism to ideas rooted, and visually expressed more than a couple of thousand years earlier in West Asia. If the hypothesis of Zimmer were true, ideas should be imbued with a gift for lying dormant in human breast for ages and ages before blooming to flower again. Though the case in point is not exactly similar but it almost touches upon Zimmer's interpretation of the inscrutably curious human mind.

(iv) *Cultural Life*

No doubt, before the Harappa civilization came to an end, a battle or skirmishes between the invaders and the defenders may have taken place. The skeletons found at Mohenjo-daro[20] lying in the streets, drains or pits without a formal burial indicate such a possibility. Nevertheless, the defeat and discomfiture of the invaded can hardly account for their total annihilation or complete extinction, and a sizable volume of the surviving population has necessarily to be reckoned with. Would they be so oblivious of all that their culture meant as not to represent their way of life in the new society that evolved in India when their own had met with an end? Some of the ideas of the seals, as the new interpretation conjures up, may reasonably be attributed to the contribution of the Harappan survivors. The disfavour extended to Paśupati, granting that the interpretation proferred is correct, and Śishṇadeva would strengthen such an inference. These, at least, would imply, as Wheeler has aptly pointed out in the following words on the adoption and retention of the Harappan way of life in the non-material field. Wheeler says, "But reason has been shown to suspect that the later Hinduism, in spite of its Aryan garb, did, in fact, retain not a little of the non-Aryan Harappan mentality and relationships, perhaps to a far greater extent than can now be proved."[21]

In contrast, the succeeding culture, inexplicably, or out of abhorrence, adopted next to nothing of the advanced urban experience of the civilization that had just ended even in the expectedly urban capital cities. The *Ṛigveda* is supposed to have

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been composed in the course of several centuries and there is some non-Aryan influence in it. The fact that the Aryans remained alien to urban life during several centuries of their stay in the country indicates that they had a strong bias for village life.

The later people were doubtless Aryan settlers, forerunners of present day Indians, and if they had been the makers of the Harappa civilization as well, the sharp difference in this material aspect of life poses a problem that cannot at present be surmounted.

(v) *Harappan Script*

The fact that the script of the Indus seals has not yet been deciphered calls at once for caution and patience in preference to speculation. Even apart from the question of the language of the seals, there is no agreement among scholars about the direction in which it is to be read, i.e., whether from the left to right or from the right to left. Lal has recently succeeded in establishing, beyond any reasonable doubt, that the writing was meant to be read, at least in some cases, from the right to left[22] but the possibility of the script being boustrophedon has also been admitted.

It has been thought that the rudiments of the proto-Brahmi script, the mother of all Indian scripts, are to be traced to the Harappan script. If the attempted identification, Harappans= Aryans were true, is it not surprising that the vast *Vedic* lore was not committed to writing in the already available script as the easier and more practical means but entrusted to the tender mercies of memory through an elaborate and tortuous time-killing process of recital to aid the memory, transmitted from teacher to pupil from generation to generation?

(vi) *Disposal of the Dead*

Even the mode of disposal of the dead practised by the Harappans, viz., by burial[23] was gradually given up in favour of cremation, which was practised side by side by the *Ṛigvedic* Aryans.

(vii) *Racial and Linguistic Affinities*

If the limited number of skulls studied from Mohenjo-daro were to be treated as a random sample far from being representative, they would show a mixed population with a bulk

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of the Mediterranean type[24]. The Mediterranean racial type has been attributed to the Dravidian speaking people of India in general[25]. While Śiva and his consort, Umā, a form of Mother Goddess, as found among the Dravidians, are to be traced to the Paśupati seal and to the Mother Goddess idea respectively, a Dravidian bias for these aspects of the Harappan religion would be indicated. The phallic emblems are likewise to be found at home among the Austric speech groups, and the presence of the proto-Australoid element among the dead in Mohenjo-daro are significant though not conclusive in this context. An attempt has been made on linguistic and racial grounds to connect the Harappans with the Dravidians[26]. The racial grounds as also to linguistic are inadequate for the present to lead to any conclusion.

(viii) *Chronological Incompatibility between the Harappa Civilization and the Ṛigveda*

It may be recalled that one of the factors that have influenced the dating of the *Ṛigveda*[27] is the date of the Boghaz Keui inscription, fixed firmly at 1365 B.C. The form of the proper names recorded in the inscription, as in the contemporary Hittite text of Kikkuli on the training of horses, are of a period before the Aryan language was bifurcated into Iranian and Indo-Aryan. Max Mueller had suggested a date around *circa* 1200 B.C.[28] as the date of the composition of the *Ṛigveda* and B. K. Ghosh, a profound *Vedic* scholar, fixed it at *circa* 1000 B.C.[29] on linguistic grounds with reference to Panini's *Ashṭādhyāyī*. On this showing, the presently unresolved chronological incompatibility between the Harappa civilization, dated provisionally between *circa* 2500 and 1500 B.C. on the one hand and the *Ṛigveda* on the other is a formidable factor in the way of commendation of Ramachandran's interpretation to ready acceptance.

To sum up, in spite of indications of parallelism between the *Ṛigveda* and the Harappa civilization, which are at best indications of spiritual contact and indebtedness, there is *a priori* no definite ground yet for tracing the Aryans to the Indus valley in the sense in which this geographical name is employed.

C. Chalcolithic Cultures of Western India and Northern Deccan and the Aryans

(i) *General*

A hesitant claim has been voiced in recent times by H. D. Sankalia for certain late features in the chalcolithic cultures of

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western India and northern Deccan for attribution to Aryan immigration from the direction of Iran about 1000 B.C.[30] The materials are to be traced in inspiration to Hissar and Sialk. Alternatively, he has suggested that the chalcolithic culture might as well be pre-Aryan.

(ii) *Geographical Distribution*

The geographical extent of this culture is broadly bound by Gilund, in District Udaipur, Rajasthan, in the north, Nasik-Jorwe, in District Nasik, in Maharashtra, in the west, Brahmagiri, in District Chitaldrug, Mysore, in the south and Tripuri, near Jabalpur, in District Jabalpur, Madhya Pradesh in the east (fig. 8). It has clearly a much southern focus in comparison with the early habitat of the Aryans in the Panjab, and the Sarasvatī-Dṛishadvatī valley. This remains a major stumbling block in the way of its being equated with the Aryans, as one understands them in India, as the authors of the *Vedas* and of the *Vedic* culture.

(iii) *Stratigraphy*

Stratigraphically, it belongs to a post-Harappa horizon as indicated by the evidence of Rangpur, District Surendranagar and Somnath, District Sorath in the Saurashtra area of Gujarat. The trend in the course of cultural expansion is from the north to south.

(iv) *Chronological Considerations*

Chronologically, the earliest phase at Navdatoli seems to recede to a date prior to *circa* 1500 B.C., on the basis of Carbon-14 assessment. But with the terminal date of the Harappa culture being fixed presently at *circa* 1500 B.C., this incompatibility is an obvious incongruity. Combining this circumstance with a central Carbon-14 date around *circa* 1200 B.C., for the end-phase of Harappa culture, as suggested by Fairservis[31], it behoves one to point to the lack of accuracy of these dates and the consequential unreliability of the present methods for the chronological assessments. Besides, if it is to be conceded that this culture begins earlier than the end-phase of the Harappa culture, as Carbon-14 dates would have it, it becomes difficult to explain the absence of Harappa features from this culture, even though the two cultures overlapped geographically, to a considerable extent. It is well known today that the geographical expanse of the Harappa culture extends now to Bhagatrav on the Tapti,

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and encompasses the chalcolithic centres lying further to the north. Yet the paradox remains that some obvious parallels with Iran do occur in this culture, but almost none with the nearer Harappa culture. Under the circumstances, the chronological position of the culture, as indicated by stratigraphy, should be posterior to the Harappa culture[32].

(v) *Iranian Influence*

The limited Iranian influence, such as is recognizable, confines itself to some pot shapes in the ceramic or metallic materials, designs of paintings or shapes of weapons. Such borrowings, neither on a large scale nor as a regular feature, would imply contacts of some kind. If the contact of the chalcolithic cultures of west-central India with the Iron Age phase of Iran, Sialk VI, cemetery B, was really effective, in the sense of a folk movement instead of merely commercial exchanges it would be but natural to expect that some iron, more than pottery or other metallic vessels, should have been imported. The possible exchanges of commercial merchandise could not have been substantial, as otherwise iron would hardly be excluded as an article *par excellence* with an exchange potential.

(vi) *Ethnic Movement*

The chalcolithic culture in question does not, therefore, seem to owe itself to any ethnic movement from Iran, nor any substantial flow of cultural influence at any stage from that direction. It does not have any basically admissible links with the Harappa civilization, and, on the whole, it is stratigraphically posterior to the latter. Geographically it covers a region to the south and south-west of the original habitat of the Aryans in India, and cannot, therefore, lay any claims to being identified with the *Vedic* Aryans. Its basic cultural equipment is different from that of the Aryan zone lying further to the north of a comparable post-Harappa period, indicating that it had no conformity with the culture presently (provisionally) attributed to the Aryans and exemplified in the Painted Grey Ware ceramic industry and its associated cultural wherewithal. Its chronological range would deprecate such a comparison or equation, or even with a late phase of Aryan expansion. The facts and circumstances lead tentatively to the conclusion that the chalcolithic culture was the creation of an indigenous people, with lateral, but not basic, influences from Iran in a post-Harappan period, almost, if not equally, contemporaneously with the so-called Aryan infiltration.

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Linguistic palaeontology and racial features should name the people who were responsible for the culture. The *Puraṇas* have suggested the name of Nāgas, which, in all probability, they were, as indicated by Sankalia. The study of the skeletal and cranial remains from Nevasa and Daimabad would forward the presently inferable position a step ahead and put the scientific stamp of either approval or rejection on the inference based, till now, partially, on circumstantial evidence.

(vii) *Links with the Painted Grey Ware Culture*

The possible stratigraphic links of this culture with the Painted Grey Ware cultural assemblage may be sought in north Rajasthan on the common borderlands of the respective cultural zones, as also along the lower reaches of the Chambal, where mutual cultural relationships, if any, are also likely to be revealed. The chalcolithic culture in Ahar seems to have shown some signs of such a link in the form of similarity of painted designs on the pottery[33].

(viii) *Conclusion*

It must also be admitted that this culture was not rudimentary in scope, nor primitive, though, no doubt, somewhat retrograde in comparison with its obvious predecessor, the Harappa culture. This is indicated by the many-sidedness of the cultural life comprising modest architectural development, defences, careful funerals, a wide miscellany of ceramic types, a taste for decoration that the painted designs implied, if a little perfunctory and repetitive, besides acquaintance with metallurgy, textiles, religious concepts and the great expansive force that accounts for its geographical extent. The representatives of the culture were, therefore, fairly advanced in cultural level, and had some kind of organized civic life.

To sum up, it cannot, therefore, be claimed that the chalcolithic cultures were the handiwork of the *Ṛigvedic* or *Vedic* Aryans. Nor is the limited Iranian influence suggestive of an ethnic movement from that direction. The lack of influences from the Harappa civilization points for the present to their indigenous inspiration in a late or post-Harappan context.

D. Post-Harappan Cultures in the North-West of the Indo-Pakistan Subcontinent and the Aryans

(i) *General*

The end of the Harappa civilization was followed by a number

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of scrappy cultural complexes, limited alike in chronological range, as judged from the depth of strata, and regional distribution (fig. 8) in the north-west of the subcontinent. This limited aspect, more than any other, would deprecate an attempted equation of these complexes with the Aryans. As Wheeler[34] sought to explain it, the decline and decay of the great Indus civilization was followed by "cultural fragmentation", which displayed itself in the emergence of distinct and mutually exclusive cultural groups, as "beggarly successors" of the great Indus civilization but "deriving very little from a sub-Indus heritage".

These comprise the cultural traits represented by (i) the cemetery 'H' at Harappa and a few other sites, (ii) the cemetery at Shahi-tump, (iii) Jhukar, (iv) Jhangar, as represented by Periods II and III, respectively, at Chanhu-daro, (v) the cairn-burials at Moghul Ghundai, Zangian, Jiwanri and Dambakoh etc., (vi) the Londo Ware, (vii) Rana Ghundai IV and V, besides (viii) the Trihni ware interposing itself between Jhukar and Jhangar.

(ii) *Cemetery 'H'*

The cemetery 'H' at Harappa was excavated by Vats in the years 1928, 1929-30, 1930-31 and 1933-34, and subsequently by Wheeler in 1946. The cemetery, which had two successive levels, representing two different modes of disposal of the dead, overlay an extensive 5 to 7 ft. (152.4 to 213.36 cm.) thick debris. The flimsy structures associable with this cemetery were found in the fourth phase of construction in the western gateway, separated from the Harappan deposits by an intervening debris deposit 3 to 4 ft. (91.44 to 122 cm.) thick. The cemetery 'H' burials were posterior to the Harappan burials, R 37[35].

The earlier and lower group of burials of cemetery 'H', called Stratum II, was characterized generally by full inhumations, accompanied by ample grave goods, represented by pots and often a full animal.

The later or second group of burials, occurring in Stratum I, consisted of fractional burials in large pots without any grave goods. The pottery from both the phases share common features, and are basically uniform in character. The ware is a well-made, sturdy, bright red ware, painted in black, which has a tendency to run. The designs consist of plant forms, ring and dot patterns, zigzag lines, groups of straight and crinkled lines, besides animal forms in symbolic and conventional shapes. The designs and motifs are entirely different from those met with in the Harappan ceramics.

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Similar pottery is found only at two other sites, in Bahawalpur area, namely, at Lurewata and Ratha Theri, both in Pakistan.

Wheeler suggested that it was the cemetery 'H' people, whom he tentatively equated, after Gordon Childe, with the Aryans, who had destroyed the Harappa civilization. The extremely limited distribution of the remains of the cemetery 'H' and the general absence of the cemetery 'H' ceramics from the pottery of later periods, discount the proposed suggestion of their being the successors of the Harappans. Besides, the presence of an intervening debris layer 3 to 4 ft. (91.44-122 cm.) deep in the habitation area and 5 to 7 ft. (152-213 cm.) in the cemetery 'H' area poses a chronological gap between the decline of Harappa and the arrival on the scene of the cemetery 'H' folks. In this context it may be recalled that, notwithstanding the presence of proto-Australoid skulls among the burials, the dominant cranial element seems to have been of the aboriginal people of the land itself.

The post-Harappan chalcolithic cultures of west-central India have only a 'technical similarity' with the basic black-on-red painted ware. In all other respects the disparity is complete, and the chronological horizon remains yet an uncertain factor. The end of Harappa is marked generally by the emergence of newer cultural strains which presuppose disturbed conditions. Such a situation is encountered at Mohenjo-daro, where the evidence of destruction is in the form of mass murders, at Harappa in the debris layers, at Chanhu-daro, where the Jhukar folks built into the ruins of the Harappans, besides at Jhukar, Lohumjo-daro and Rana Ghundai, after the IIIc occupation.

(iii) *Shahi-tump*

The distinctive post-Harappan cultural trait known from Shahi-tump[36] is that represented by the finds in a site of the name near Turbat. The cemetery itself was laid into the abandoned site of the Kulli culture associable in the later phase with Harappa.

The burials were of two types, namely, (a) inhumation burials to the accompaniment of grave goods, and (b) groups of grave goods without any human remains. The inhumation burials are interesting in themselves, and consisted of full inhumation on the side or back with legs flexed. The accompanying grave goods included pottery, beads of stone, alabaster cups, objects of copper or bronze in the form of tools, ornaments or seals, stone blades and pestles and the like. Occasionally cooked food was also offered and is evidenced by animal bones, sometimes charred. The pottery from all the burials is uniform in character, being a thin

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hard and well-made ware, usually grey, but changing through pinkish to yellowish buff colour, and painted interiorly as well as exteriorly in black which changes occasionally to reddish brown. The designs consisting of the *Svastika,* angular spirals, lozenges, chevrons and triangles, are arranged in zones or panels on the exterior, and the interior is often divided into squares within which the circular forms are executed[37]. The shapes comprise bowls, deep and shallow, with a foot-ring, jars and globular or conical beakers etc.

Among the objects of copper the spear-head, shaft-hole axe and stamp-seals have special significance in regard to chronology and folk movements. The large spear-head recalls similar shapes from Harappa. The splayed and socketed axe, called the shaft-hole axe, is compared with Sumerian and Akkadian parallels, and is available at the chalcolithic site at Nagda, in iron, in Period III. The circular stamp-seals are similar to those occurring at Hissar IIb and IIIb, Anau III, and Susa, and are datable to *circa* 2000 B.C. or later[38]. The skull type at Shahi-tump is recognized to be of mixed nature, approaching the Caspian or Nordic type. This limited evidence would also suggest movement from the west towards the later phases of the Harappa civilization.

(iv) *Jhukar*

The Jhukar Culture[39], met with at Jhukar, Lohumjo-daro and Chanhu-daro, was represented by Period II at Chanhu-daro in the 1935-36 excavations of E. Mackay. It occurs as an overlap in the last phase of the Harappan occupation at the site, and represents, limitedly, the culture of a people who succeeded the Harappans. That they could not have exercised a lasting or effective influence on posterity is indicated by the limited distribution of the cultural repertoire as stated above.

The culture was characterized by flimsy housing made of matting walls on brick-floors, a distinctive painted pottery, and a miscellany of objects, which serve at best to emphasize the differences with Harappa. The pottery, a buff ware, with painted decoration in black and red, comprised small footed jars, bottles, offering stands and saucers. The painted designs comprise geometric and stylized plant motifs. Piggott, who made a critical and comparative study of the pottery, holds the view that it arose as a result of the combination of a variety of elements, in which influences from Kulli, Harappa and Amri could be traced. Some motifs have parallels in Sialk III as well as Hissar IB, and turn up again in the accreditedly late cemetery at Jiwanri in Makran. To quote his words, "On the whole, there seems no reason to regard Jhukar pottery as anything but a native product arising

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out of the disturbed conditions and folk movements after the fall of the Harappa empire, when refugee tribes were leaving Baluchistan and settling in Sind."[40]

Among the various objects of daily life a painted head rest, a shaft-hole axe, resembling one from Shahi-tump, copper stamp-seals, bearing motifs, far removed from those at Harappa, with no legend deserve special mention. The seals appear to indicate, on the contrary, contacts with Sumer, Elam, and even with the Hittite Asia Minor. The beads again show contacts with Hissar IIIc, Anau III, and Jemdet Nasr or elsewhere in Sumer in early Dynastic contexts.

The pins of copper, which were used obviously in the dress, have no parallels in Harappa, and only one is said to be vaguely reminiscent of a type found in Sialk IV.

The pins, meant to be used for fixing folds of dress, bear close resemblance to a pin with a revolving upper part found at Nagda. A bead with decorative circlets found at Jhukar[41] recalls one from Nagda.

Otherwise the cultural repertoire at Jhukar appears to have nothing positively in common with the later chalcolithic cultures in general, and is intrinsically richer in variety.

(v) *Jhangar*

The Jhangar culture[42] is represented at the site itself, in phase III at Chanhu-daro, and at Lohumjo-daro in Sind. Its exact chronological horizon is unknown. Stratigraphically it is later than Jhukar and had obviously no connexion with it.

The pottery was a grey or black ware produced on a slow wheel or tournette, and decorated with incised designs in the shape of chevrons, herring bone patterns or hatched triangles.

These diverse cultures obviously have no claims to being designated as the Aryan cultures not merely because of their fragmentary nature, but also the limited distribution, the absence from the main focus of Aryan settlements in the Ganga plains, or the lack of any lateral influence on the cultural life of the Aryans.

(vi) *The Cairn-burials and the Londo Ware*

The cultural life represented by the cairn-burials and their chronology have been described before, and it requires no effort to discount any claims for these cultural traits to be equated with the Aryans on the grounds of their restricted distribution and location entirely in the north-western parts, outside the central pale of the early Aryan home in India, besides, of course, the chronological incompatibility.

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(vii) *Rana Ghundai IV and V*

The same remarks as above hold good for the post-Harappan phases, viz., Periods IV and V, respectively, at Rana Ghundai.

The occupation at Rana Ghundai, in north Baluchistan, began indeed before the emergence of the Harappa civilization, but towards the end of the IIIc phase of occupation it overlapped with an early part of the Harappa civilization about 2000 B.C.[43]

At this stage the site appears to have been burnt and sacked, and a new settlement arose upon the debris, called RG IV. The pottery of this period is entirely different from that of the earlier levels, and is marked by a coarse ware—in the form of painted bowls. Still later, but not after the occupation of RG IV was destroyed again, by fire, there arose another settlement on the site, called RG V. With the changing folks came a change in pottery which is decorated with relief pattern, but not painted.

Similar evidence of repeated burning down of the traces of habitation was also observed at Dabarkot, the last phase of which was Harappan. The occurrence of the relief-decorated pottery of RG V on the surface indicates the chronological level of the destruction by fire.

(viii) *Trihni Ware*[44]

A distinctive ceramic ware marked by bold floral decorations, recalling the Londo ware designs, was found at Lal Chhato, near Trihni, at Shah Hasan, Lohri, round the lake Manchhar, and at Chanhu-daro in central Sind (Pakistan). It is associated with chert blades or flakes and is roughly dated to *circa* 1400-1200 B.C. Neither well-known nor widely distributed, the Trihni cultural *ensemble* represents one of the 'beggarly successors' of the Harappans, and can scarcely lay any claims to Aryan inspiration.

To sum up, the limited aspects and distribution of these cultural fragments would rule out any equation with the Aryans.

E. "Copper Hoards" and the Aryans

(i) *General—Views of B. B. Lal*

A distinctive cultural *ensemble*, as yet not clearly correlated either in stratigraphy or the sequence of Indian cultures, is formed by the finds of 'copper hoards' in varying volumes over widely expansive regions, but with a marked concentration in the Ganga plains, reaching upto Chhota Nagpur and Ranchi in Bihar.

The 'copper hoards' have remained, however, the strongest candidates to be associated with the Aryans, ever since R. Heine-Geldern first formulated his theory on the equation in 1936[45].

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These hoards have been reported from time to time from different parts of Uttar Pradesh, Bihar, Madhya Pradesh, West Bengal and Orissa (fig. 9). Lal's treatment of the subject has not been improved upon, though a hoard was recovered from Bahadarabad in 1953[46], and with this the story of actual finds is practically up-to-date, save for one relatable object from the upper levels of Lothal[47].

The bulk of the copper implements found in hoards or otherwise have occurred in the Ganga plains, though some have also occurred outside. These have also a typological affinity suggesting a composite class by itself. The objects can be divided into eight types (fig. 10), namely, (i) flat celts, (ii) shouldered celts, (iii) bar-celts, (iv) rings, (v) harpoons, (vi) hooked spear-heads, (vii) antennae swords, and (viii) anthropomorphic figures of indeterminate use. Chemical analysis has shown that they are, nearly all, made of copper, out of ores extracted locally, with a minor admixture of nickel.

Though most of the specimens occur in the Ganga plains or towards its east, specimens of the flat celt, antennae swords, harpoons, and, so far, a single specimen, broken and fragmentary, of the anthropomorphic figure, which has been found at Lothal, occur outside this zone.

Flat celts have been reported from Harappa and several other Indus sites, besides four at Jorwe near Nasik, Maharashtra. As Lal has pointed out, the shape of the celts is so basic that it cannot be used as a means of typological comparison or related conclusions.

Harpoons, similar to those from India, have occurred among bone objects in the Magdalenian culture, widely removed from the specimens in time and space. Though simple barbs from Transcaucasia, Talish and Luristan in Iran are known, they can, in spite of Heine-Geldern's insistence, scarcely have inspired the Indian specimens. Besides the intermediate land-mass has not yielded specimens to suggest any definite cultural link. Nearer home they are comparable, on the contrary, to cave paintings in Ghor-mangar in District Mirzapur, Uttar Pradesh, and suggest the source of inspiration.

Antennae swords, of a comparable shape, have been found in the Koban region of upper Iran with a difference in that the hilt and handle are separate pieces that have been joined subsequently, besides being of plain cross-section, as compared to the ridged one of the Indian specimens, and having a hole in addition. These are made of bronze within India but outside the Ganga plain some have appeared also at Kallur in Andhra Pradesh.

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(ii) *Views of Heine-Geldern*

Heine-Geldern has brought within the same complex a certain number of specific shapes with moorings and inspiration in the west (fig. 11). These comprise (i) a trunnion axe, found at Shalozan, in the Kurram valley, near the Afghan border, (ii) a bronze dagger with a hilt and a splayed fan-shaped end, found near Fort Munro, in the Sulaiman hills, (iii) a shaft-hole axe found at Shahi-tump, and (iv) an axe-adze from Mohenjo-daro.

The trunnion axe from Shalozan (fig. 11) is shown to have parallels in the Mediterranean region in Europe, Transcaucasia and Iran, in a chronological range of *circa* 1200-1000 B.C., and later.

The bronze dagger from Fort Munro is stated to be similar to those from western Iran, "dating from approximately 1200 to 1000 B.C."

About the antennae swords, Heine-Geldern is positive, in spite of Lal's reasoned emphasis on the basic differences between the antennae swords of India and those of the Koban region, that they were inspired from the west, and that they occur in the Koban region between *circa* 1200 and 1000 B.C., or even a little later.

The axe-adze at Mohenjo-daro (fig. 11) is to be traced to anywhere in Rumania, the Ukraine, the northern Caucasus, Assyria and Iran. It is said to have evolved in Transylvania in the first half of the second millennium B.C. From there it travelled to the Near East, where it occurs at Hissar IIIc[48] and Turang-tepe, between 1200 and 1000 B.C.

Heine-Geldern also refers to the occurrence of a copper rod[49] from the uppermost level of Harappa (fig. 11), topped by a dog and an antelope as comparable to copper rods from Hissar IIIc and to bronze pins from Koban and Luristan. Though Piggott had dated the objects to *circa* 1500 B.C., Heine-Geldern[50] would not date them earlier than 1200 B.C.

A pin from Mohenjo-daro (fig. 11) topped by two deer heads is again comparable to similar pins in Koban, and to copper rods with horse heads at Hissar IIIc, and on this basis, the date would not be earlier than the twelfth century B.C., in spite of its occurrence at a considerable depth.

To this array of argument on evidence Heine-Geldern has added that of a bronze mace-head[51] from Chanhu-daro (fig. 11), recovered "either from the final phase of the Harappa level or from the subsequent Jhukar level", and which had been compared by Piggott to mace-heads from Luristan and Hissar IIIc, again agreeing in chronology with the general date, 1200-1000 B.C., for almost all these objects.

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The list is not yet exhausted. The seals[52] from the Jhukar levels of Chanhu-daro, which are button seals, discoid in shape, with a transversely perforated boss at the back, are stated to be comparable to Hittite seals, datable to about 1200 B.C.

To sum up, the presence of this diversely large quantum of comparable objects of cultural equipment in the north-western parts of the Indo-Pakistan subcontinent in a post-Harappan (or a late Harappan) chronological context cannot be set down to a mere accident, but has to be traced further to the west in Iran, Transcaucasia or Anatolia, in chronological ranges extending between 1200 and 1000 B.C. Since these objects could not be held as of Indian origin and since the inspiration is to be sought in the west, the suggested chronological range has also to be held as correct and would call for a corresponding change in the upper dating of the Harappa civilization.

Since broadly also the Aryans are taken to have passed through Transcaucasia and Iran on their way to India at a corresponding date, and since they are also held as post-Harappan in point of emergence, the objects in question would have to be associated with the Aryan immigration but need not be attributed to them. In view of Lal's emphasis on the basic differences between the objects found in the north-western parts of the subcontinent with those found in the Ganga plains, Heine-Geldern modifies his earlier views slightly, but insists that the antennae swords are definitely of western inspiration. He goes on to state, "The archaeology of India and particularly of the period in question, is still very imperfectly known. Therefore it would be rash to draw conclusion *ex absentia*. Moreover we cannot be sure that all groups of invading Aryans shared the same material equipment. There is even a possibility that groups of other peoples—other Indo-European or, perhaps, Caucasian tribes—joined the Aryans in their migration towards the East. This might explain cultural differences within the same movement and the same period."[53]

Despite the revised arguments of Heine-Geldern, the broad and almost mutually exclusive division of the two sets of the bronze and copper objects, respectively, into those of foreign inspiration in the north-western parts of India on the one hand and those of the Ganga plain and further eastern regions on the other still holds good, in spite of the possible extraneous affinities of the antennae sword of the latter group. Nevertheless, its limited distribution and the occurrence of its prototype or counterpart, the hooked spear-head, besides, of course, the obviously retrogressive step of its manufacture, generally, in copper and the basic differences in its form would support an indigenous origin. In the present stage of knowledge the genetic connexion

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between the two similar objects separated by wide expanses of space cannot be said to have been established beyond any reasonable measure of doubt. Notwithstanding this difference, Heine-Geldern has succeded in establishing the presence of objects of foreign extraction towards the end-phase of the Harappa culture, about 1200 B.C. or slightly later, presuming that the dates ascribed to the corresponding levels in the west are correct. The Aryan invasion into India after the disappearance of the Harappa culture or towards its end-phase, is almost an accepted fact in history and archaeology. The disjointed nature of the evidence as also its extreme scrappiness would call for a counsel of caution on its interpretation, and, as though in deference to it, Heine-Geldern has already attributed these objects, suggestively, to other contemporary tribes which shared in the invasion of India with the Aryans. It may, in fact, be borne out by the evidence of several scrappy and often flimsy, but distinct, cultural traits occurring in immediately post-Harappan stratigraphy in the north-western parts of the subcontinent, and this interpretation goes a long way towards explaining the stunted and regionally restricted cultural complexes that did not or could not, owing to circumstances, share in the colonization and Aryanization of the rest of India. This must be set down, in part, especially as a presumption, to their small numbers. Hence, perhaps was the 'cultural fragmentation', observed by Wheeler. It must also be stated at once that the other accompaniments of the cultural influx implied by the bronze objects in question in the form of any distinct ceramic etc., have not come up in any influential position of strength or force, to be able to acquire, in course of time, an expansive, if not an all-India, field. It may, therefore, be stated that the 'copper hoards' did not have any connexion with the Aryan immigrants.

Lal has already pointed out the possibility of the 'copper hoards' of India being associated with the ancestors of the aboriginal proto-Australoids of India[54], represented to-day by the Mundas and Santhals etc., inhabiting to this day the area wherefrom the hoards have been recovered. Another ground adduced by Lal is the similarity in shape of the bar-celts to the neolithic stone celts found in the eastern parts of India, implying the existence of inspirational prototype models in stone. The harpoons again are paralleled by weapon shapes in rock paintings in the caves in the Mirzapur District. While the parallelism is tempting enough to encourage the suggestion of a genetic connexion between the prehistoric way of life and the later metallic equipments, the question continues to pose a problem. Lal has also referred to the mention of flat-nosed *Nishādas* in the *Vedic* literature, whom

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the Aryans encountered in the Ganga plains, and has raised the possibility of the *Vedic* tribal name being a reference to the makers of the 'copper hoards'. At present the problem is beset with difficulties as the stratigraphic context of none of the 'hoards' is clear, and no other cultural equipment can, in fact, with certainty, be associated with them. Circumstantially, however, they do not appear to be associated with the Aryans. In this connexion it has to be borne in mind that the Aryans, a vigorous group, had not only had knowledge of bronze, but also of iron, a point which will be made clear in the next chapter, before their immigration into India. It was, therefore, unlikely that they would recede normally to a retrograde step of pure copper or bronze metallurgy. The specific shapes of the objects, distinct from anything known in the west, would also counsel against such an identification. The neolithic prototypes would serve as another criterion for distinction. The prevalence till to-day of primitive tribes in the areas bearing the copper equipment suggests an interconnexion and yet recalls the literary references to an autochthonous people in the region.

The apparent anomaly and contrast between their present low standards of living and the high degree of technical skill and variety of life's many-sidedness indicated by the objects themselves present no insuperable problem for such an equation, as the parallel case of the disappearance of the highly advanced material civilization of the Harappans, which was scarcely emulated by their successors, would tend to prove.

(iii) *Conclusion*

Thus it is established that the 'copper hoards' cannot be attributed to the Aryans.

F. Claims of the Scythians to the Introduction or Popularization of Iron in India

As Scythians playd a considerable rôle in India's past in the early historical period, and also employed iron, the possibility of the Scythians doing anything in the matter of the introduction or popularization of iron in India deserves a consideration in passing.

It is clear that the Scythians had some contact with the Hittites as some of their works of art can be traced to the latter[55]. It is likely, therefore, that their indebtedness to the Hittites would extend beyond art motifs and would encompass more fundamental equipments of life, namely, objects of iron. Some Scythian tribes began to use iron about 1200 B.C., in north-east Siberia[56],

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By 800 B.C., they were obtaining their supplies of iron from the regions of the Dnieper and from the Caucasus[57]. It is also quite significant that their first burials, prior to 1200 B.C., were 'flattish graves marked with a circle of boulders'[58]. Later they started building large barrows or tumuli.

The Scythians are mentioned in the cuneiform inscriptions of Darius I at Persepolis and Nakshi Rustam. Herodotus states that the expeditionary forces of Xerxes included the Śakas wearing trousers and pointed headgears.

J. N. Banerjea writes that "they may have spread in course of time over far distant regions and there is reason to believe that smaller migrations of these peoples in countries south of the Hindukush were taking place in comparatively early times."[59] It is also conceded that the Śakas on the borders of the Persian Achaemenid empire were the descendants of the older immigrants in the area from Central Asia, and this movement may have begun as early as the 8th century B.C.[60] Though the Scythian period of Indian history does not begin until several centuries later, it is possible, however, that the Scythians periodically trickled into India in the wake of the Persian conquest of the north-western regions of India, which took place about 520 B.C. If they knew indeed the use of iron they may surely have used iron objects but it is clear that they had no hand in either its first introduction into India or even in its popularization, for long before the Scythian Period of Indian history iron had already entrenched itself as a utile metal.

C. Users of the Painted Grey Ware, who were among the First to use Iron in India, and the Aryans

In view of discussion of the divergent claims of the various cultural complexes to be associated with the Aryans in India it becomes clear that the case of the Painted Grey Ware to be recognized as the ceramic of the Aryan settlers in the Ganga-Yamuna plains gains ground. The process of elimination has thus left the field free for the users of the Painted Grey Ware to be equated with the Aryans. The presence of the bones of a horse at Hastinapura[61] in association with the Painted Grey Ware recalls the traditional concept of the association of the horse with the Aryans.

The proven association of iron with the Painted Grey Ware, which is the earliest stratigraphic evidence of iron in India, points to the obvious source of its inspiration. But this cannot be regarded as an evidence of its independent evolution in this country, in view of the earlier occurrences of iron elsewhere in the

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ancient world, as also of the earlier emergence of Aryan speaking people in other regions outside India. When, where and how the connexion between the Aryan speaking peoples and the Iron Age metallurgy took place remains to be seen, especially in its implication on the introduction of iron in this subcontinent as also the infiltration of the Aryans into India. All this will be discussed in the next chapter.

NOTES AND REFERENCES

1. Wheeler, *Early India and Pakistan*, p. 28.

2. It extends at least upto Alamgirpur, District Meerut, Uttar Pradesh, in the Ganga plain, to the north-east, (see *I.A.*, 1958-59, pp. 50-54), while unproved claims of Harappan affinities for finds at Kausambi, on the Yamuna, near Allahabad, Uttar Pradesh, further eastwards have already been made (see *I.A.*, 1957-58, p. 48).

The discovery of about twenty five Harappan sites in the Bikaner Division of northern Rajasthan has established the existence of the Harappa civilization in the valleys of the Sarasvatī and Drishadvatī which formed the prime habitat of the *Rigvedic* Aryans and has indicated the expansive character of the far-flung and so-called Indus civilization, extending beyond the bounds of the Indus system (see A. Ghosh, The Rajputana desert—its archaeological aspect, *Bull. Nat. Inst. Sciences*, No. 1, 1952, pp. 38-40).

The recent discoveries of the Harappan sites of Telod and Mehgam, in District Broach, on the Narmada estuary and at Bhagatrav and Hasanpura, in District Sorath, in the Tapti valley have pushed the frontiers of the civilization into the very fringes of the Deccan (see *I.A.*, 1957-58, pp. 13-15).

3. The architectural remains of Harappa and Mohenjo-daro are well known enough.

4. *I.A.*, 1954-55 to 1960-61. The most remarkable discovery on the site was of the remains of a harbour or dock-yard pointing at once to its importance as a commercial centre and as a centre of maritime activity (*I.A.*, 1958-59, pp. 13-14, pl. XV A and B).

5. *I.A.*, 1960-61, pp. 31-32.

6. John Marshall, *Mohenjo-daro and the Indus Civilization*, Vol. I, pp. 52-56, pl. XII, fig. 17.

7. *Ibid.*, pp. 58-63, pls. XIII and XIV.

8. *Ibid.*, pp. 49-52, pl. XII, figs. 1-10.

9. *Ibid.*, p. 67, pl. XIII, fig. 17.

10. *Ibid.*, pp. 356-357, pl. XCVIII; Wheeler, *The Indus Civilization* (Cambridge History of India, Supplementary Volume), pp. 64-65 (1958).

11. V. M. Apte, on Religion and Philosophy in *The Vedic Age, The History and Culture of the Indian People*, Vol. I, 1952 (2nd impression), pp. 360-376.

12. *Ibid.*, pp. 376-378.

13. T. N. Ramachandran, *Presidential Address, Indian History Congress*, Nineteenth Session, Agra, 1956, Section I. This scholar has elaborated this interpretation in numerous lectures delivered by him from time to time in recent years.

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14. The *Mahisha* or buffalo is described in the *Ṛigveda*, IX, 96, 6, as follows:

Brahmā devānāṁ padaviḥ
Kavīnāṁ ṛishirviprāṇāṁ mahisho mṛigāṇāṁ
Śyeno gṛidhrāṇāṁ svadhitir-
Vanānāṁ somaḥ pavitramatyeti rebhān

Wilson translates it thus: The *Brahmā* of the gods, the guide of the sages, the *ṛishi* of the pious, the buffalo of the wild animals, the falcon of the vultures, the hatchet of the deadly weapons, the soma passes through the filter with a roar.

15. The *Śishṇadevas* are mentioned twice in the *Ṛigveda*, viz., VII, 21, 5 and X, 99, 3. As Macdonell and Keith suggest, the word "refers probably to the phallus worship of the aborigines" (Macdonell and Keith, *Vedic Index of Names and Subjects*, Vol. II, p. 382). *Ṛigveda* VII, 21, 5 reads as follows:

Na yātava Indra jujurvanor
na vandanā śavishṭha vedyābhiḥ
Sa śardhadayor vishuṇasya jantormā
Śishṇadevā api gurṛitaṁ naḥ

Wilson (*Rigveda Translation*, IV, p. 151) translates it thus: "Let not the *Rākṣasas*, Indra, do us harm: let not the evil spirits do harm to our progeny; most powerful Indra: let the sovereign lord, (Indra), exert himself (in the restraint) of disorderly human beings, so that the *unchaste* may not disturb our rite". *Ṛigveda* X, 99, 3 reads as follows:

Sa vājaṁ yātāpadushpadā yan
tsvarshātā parishadat
sanishyan
Anarvā yachchhataduṛasya vedo
ghnañchhishṇadevāñ abhi
varpasā bhūt

Wilson translates it, "Going to the battle marching with easy gait, desiring the spoil, he set himself to the acquisition of all (wealth). Invincible, destroying the phallus-worshippers, he won by his prowess whatever wealth (was concealed in the city) with the hundred gates." *Yāska* (IV, 19) describes: "*Śishṇadevaḥ abrahmacharya ityarthaḥ*", but it may have the sense of those who have the *Liṅga* (phallic emblem) for a deity.

16. Marshall, *op. cit.*, I, pp. 44 ff., pl. X; M. S. Vats, *Excavations at Harappa*, Vol. I, pp. 22, 74.

17. See illustrations in Marshall, *op. cit.*, Vol. III, pl. LXXVIII, fig. 20, pl. LXXXIV, figs. 3-18.

18. Marshall, *Ibid.*, Vol. I, fig. 24. Ramachandran quotes from the *Ṛigveda* IV, 58, 3, in the paper named above, thus: *Tridhā baddho vrishabho roravīti maho devo martyāñ āviveśa*, and translates: "The thrice bent bull goes on roaring that the Great God (is no longer in some invisible heavens) has actually completely entered the mortals."

19. H. Zimmer, *The Art of Indian Asia*, 1954, Vol. I, part IV, in the chapter on Mesopotamian patterns in Indian Art, pp. 42-67.

20. Wheeler, *The Indus Civilization*, 1960, p. 98.

21. *Ibid.*, p. 102.

22. Lal, in a paper presented to the first International Conference on Asian Archaeology held in New Delhi, in December 1961.

23. Though both burial and cremation were known to the *Ṛigveda*, it should be clear from the paucity of finds of burials of this period and the preference extended to cremation in the later *Vedic* period, that cremation had come to stay in preference to burial.

24. Wheeler, *op. cit.*, p. 56.

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25. Barton, *Scientific and Hamitic Origins*, p. 39; Father Heras, *Proto-Indo-Mediterranean Culture*, p. 159.

26. Father Heras, *Ibid.*, p. 159 ff.

27. The divergent views on the date of the *Ṛigveda* have been considered in chapter 5. Here the date that appears reasonable to the author has been employed as the basis of discussion.

28. Max Mueller in his *History of Ancient Sanskrit Literature*, published in 1859, expressed the view that by 1000 B.C. at the latest the *Ṛigveda Saṁhitā* was composed, and the date of 1200-1000 B.C. was the date of the *Ṛigveda* as a *terminus ad quem*. The basis of this calculation was the consideration that Buddhism is the result of a reaction against Brahmanism and it presupposes the existence of the entire *Veda*. He expressed, however, the view, later, in his Gifford Lectures on 'Physical Religion' in 1889 (published in 1901) that "we cannot hope to fix a *terminus a quo*, whether the *vedic* hymns were composed 1000 or 1500, or 2000, or 3000 B.C. no power on earth will ever determine".

M. Winternitz considered the different views on the chronology of the *Vedic* literature prevailing in his time, including those of Max Mueller, and came to the conclusion on the same grounds as the latter, to the exclusion of astronomical data, in addition to the inscriptional evidence from Boghaz Keui, linguistic interrelationship between the *Veda* and *Avesta*, and geological speculations that the beginning of the development should be dated to between 2500 and 2000 B.C. and the end between 750 and 500 B.C., relying entirely on the factor of the possible time that could be conceded to the rise of the Buddhistic or Jain revolt against Brahmanism, in the *History of Indian Literature*, Vol. I, 1927, pp. 290-310.

29. B. K. Ghosh, The Aryan Problem, in *The Vedic Age, The History and Culture of the Indian People*, Vol. I, Second impression, 1952, p. 203.

30. Sankalia, in *Illustrated London News*, September 5, 1959, and *Sārdha-Śatābdī Special Volume*, published by the *Asiatic Society of Bombay* (New Series), 1959, pp. 229-39; *Indian Archaeology Today*, pp. 96-99.

31. Walter Fairservis (Jr.), The Chronology of the Harappan Civilization and the Aryan Invasion, *Man*, XLVI, Nov. 1956, pp. 153-156. See also Chapter 5.

32. Sankalia in *Indian Archaeology Today*, pp. 81-99.

33. *I.A.*, 1955-56, p. 11.

34. Wheeler, *op. cit.*, p. 99; Stuart Piggott, *Prehistoric India*, 1950, pp. 238-239.

Piggott explained that the great Harappa civilization was destroyed by "the arrival of new people from the west", who were "conquerors who travelled light and adopted the pottery traditions of the regions in which they established themselves". This was indicated by the burning of the Baluchi villages and the equipment of the graves at Shahi-tump. About this time the civilization, had already become 'effete' at Mohenjo-daro and the people were on the defensive, as revealed by the rebuilding of the citadel at Harappa, and in spite of these precautionary measures they were overwhelmed by the 'conquerors'.

35. Wheeler, *A.I.*, no. 3, 1947, pp. 58-130; Lal, *A.I.*, no. 9, 1953, pp. 87-89; B. S. Guha, *Racial elements in the Population* (Oxford Pamphlets on Indian Affairs, 1944).

36. A. Stein, *An Archaeological Tour in Gedrosia, M.A.S.I.*, 1931, no. 43, pp. 88-103.

37. A. Stein, *Archaeological Reconnaissance in North-West India and South-East Iran*, London, 1937, pp. 118 ff.

38. E. F. Schmidt, *Excavations at Tepe Hissar Damghan*, Philadelphia, 1937, pl. XXVII; C. F. A. Schaeffer, *Stratigraphie Comparée et Chronologie de l'Asie Occidentale*, London, 1948.

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39. N. G. Majumdar, *Explorations in Sind, M.A.S.I.*, no. 48, 1934, pp. 51-8; E. Mackay, *Chanhu-daro Excavations*, 1943, p. 103 ff.; Piggott, *op. cit.*, 1950, pp. 221-26.

40. Stuart Piggott, *op. cit.*, p. 223.

41. *Ibid.*, p. 224.

42. Mackay, *op. cit.*, 1943, pp. 132 ff.

43. Piggott, *op. cit.*, p. 214.

44. N. G. Majumdar, *op. cit.*, pp. 61-7, pls. XXIII and XXIV and figs. 14 and 18, whence D. H. Gordon, The Pottery Industries of the Indo-Iranian Border, *A.I.*, nos. 10 and 11, pp. 170-1.

45. R. Heine-Geldern first wrote his views in his paper on the 'Archaeological traces of the Vedic Aryan', *J.I.S.O.A.*, IV, 1936, pp. 87-113; and followed it up a year later in his paper on the 'New light on the Aryan migration to India', in the *Bull. Amer. Inst. Iran. Art and Arch.*, V, June 1937, pp. 7-16, in both of which he recognized the Aryans as the introducers of the copper implements into India.

Lal pointed out in his excellent review of the position, in 1953, in his paper on "Further copper hoards from the Gangetic basin and a review of the problem", *A.I.*, no. 7, pp. 20-39, the obvious anomaly between the specialized objects of apparent western inspiration and those from the Ganga plains.

Heine-Geldern, while reconsidering the evidence in the light of Lal's criticism, brought forth a few new issues and conceded that if the copper objects of the west had not been brought by the Aryans, they came with other tribes that shared with the Aryans in the invasion of India. His latest views were expressed in his paper on 'The Coming of the Aryans and the End of the Harappa civilization', *Man*, Vol. LVI, Oct. 1956, pp. 136-40.

46. Lal, Protohistoric Investigation, in *A.I.*, no. 9, p. 93.

47. *I.A.*, 1957-58, p. 13, pl. XXI. A.; J.E. van Lohuizen de Leeuw was the first to point out in her paper on *'De Protohistorische Cultuuren van Voor-Indie on hun datering'*, Leyden, 1960, that the piece in question though published as a celt was to all appearance an anthropomorphic figure. To quote her own words, *Ibid.*, pp. 24-25: *'Voorts mag niet onvermeld blijven dat er onlangs in de Harappa-nederzetting to Lothal een fragment is ontdeckt, dat als bijl gepubliceerd, doch dat er all schijn van heeft voor de koperdepots typerende anthropomorfe figuur te zijn waarvan de armen en benen zijn afgebroken'*. It simply means that it may be mentioned that a fragment discovered at Lothal in the Harappan settlement, has been published as a celt. To all appearances it has a similarity to the anthropomorphic form of the copper hoards, though its legs and arms are broken.

Y. D. Sharma, independently, as I understand from the scholar, arrived at an identical conclusion which he stated in his paper on the subject presented at the first International Conference on Asian Archaeology in New Delhi, 1961.

48. Heine-Geldern, *op. cit.*, 1936, pp. 94-98; China, die Ostkaspische Kultur und die Herkunft der Schrift, *Paideuma*, Vol. IV, 1950, pp. 53-58, 86.

49. Heine-Geldern, *op. cit.*, 1956, pp. 137-8.

50. *Ibid.*, p. 137.

51. *Ibid.*, p. 138.

52. *Ibid.*, pp. 138-9.

53. *Ibid.*, p. 139.

54. Lal, *op. cit.*, pp. 32-35, 38-39; Protohistoric Investigation, *A.I.*, no. 9, p. 93, wherein he writes that "Professors Childe, Piggott, Wheeler and Haimendorf have agreed (in correspondence) that the Hoards need no longer be associated with the Aryans".

55. T. T. Rice, *The Scythians*, pp. 150, 155-6, 167.

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56. *Ibid.*, p. 36.
57. *Ibid.*, p. 36.
58. *Ibid.*, p. 38.
59. J. N. Banerjea, in his chapter on the Scythians and Parthians in India, *Comprehensive History of India*, Vol. II, 1957, p. 187.
60. *Ibid.*, p. 187.

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CHAPTER 5

ADVENT OF IRON IN THE OLD WORLD AND THE MOVEMENT OF THE ARYANS

A. Introductory

(i) *Probable Source from which the Painted Grey Ware was imbibed and its Bearing on Adoption of Iron*

The Painted Grey Ware pottery, a very distinctive ceramic ware, now shown as of Aryan workmanship, also represents the earliest cultural complex after the one using the so-called 'ochre coloured pottery' at Hastinapura.

The distribution map of the Painted Grey Ware (fig. 18) shows clearly its northern bias and the trend of its movement or spatial expansion. The tendency of the ware is seen to become simplified, the farther it proceeds towards the peripheral areas, as observed at Ujjain or Kausambi. At Sravasti the evidence shows that the basic ceramic ware of the next succeeding cultural phase in India derives itself from this ware[1], and both are produced under the same reducing conditions of firing.

As to the source of inspiration of the Painted Grey Ware, a question would naturally arise if it was evolved in India or brought from outside. Lal in his endeavour to trace its antecedents has cited several sites outside India where similar or allied ceramics have been found, namely, Tsani, Tsangli and Zerila in Thessaly (Greece), Shah-tepe and a site to the south of Lake Urmia in Iran, and in Sistan which are assignable very broadly to the 2nd millennium B.C.[2]

B. K. Thapar[3] has recently drawn attention to a few more sites where pottery of allied nature has been found, though an interconnexion among them is neither suggested nor as yet possible to trace. At the same time it is held that the Painted Grey Ware was, at the time of its earliest known occurrence in India, fully developed as the result perhaps of a long established tradition.

The occurrence of the Painted Grey Ware in Lakhyopir in Pakistan has extended the frontiers of the ware and adds to the argument for its Aryan affiliation. It is clear, nevertheless, that an extraneous source of development of this ware is yet difficult to establish.

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(ii) *Shahi-tump as the probable Source of the Painted Grey Ware*

S. C. Ray[4] has recently pointed out that the material evidence of the cultural equipments of the Aryan culture, as revealed in the *Vedas,* has not been found anywhere, in spite of almost ceaseless search for them over the years. In this context, it is more likely, especially in ceramics, that they adopted the equipments of the region in which they settled. Such a practical experience has been referred to by Stuart Piggott in respect of the obvious 'conquerors' of the Indus civilization, as shown by the finds in the graves of Shahi-tump[5]. The basic ceramic of Shahi-tump was a painted grey ware, and a possible connexion between this ware and the more widely distributed Painted Grey Ware, now associated with the Aryans, is easy to see or concede. If so, there is no difficulty to explain how it was imbibed.

Heine-Geldern's view of several tribes other than the Aryans sharing in the invasion of India accords well with Wheeler's interpretation of the phenomenon of multiplicity of limited cultural traits in the post-Harappan epoch as 'cultural fragmentation' as well as with Stuart Piggott's 'conquerors'.

One of these 'conquerors' had obviously produced and employed a painted grey ware at Shahi-tump. It was an attractive enough ceramic ware to lend itself to emulation by contemporary folks, and may have been the possible source from which the Painted Grey Ware in general in the northern plains of India were derived by the Aryan tribes. This possibility would time the inculcation of the ceramic tradition at the moment when the main Aryan mass may have come into contact with the Shahi-tump people. On the present showing, it should appear fairly early, almost at the very beginning of the career of the Aryan settlement in India.

(iii) *Use of the Painted Grey Ware in the Sarasvatī-Dṛishadvatī Valley in Bikaner, possibly before the Entry of the Aryans into the Ganga-Yamuna Plains*

At any rate they used the Painted Grey Ware from the moment of their settling down in the Ganga-Yamuna plains. The *Ṛigveda* itself mentions these two eastern rivers and also the defeat of the Dāsas under the leadership of Bheda on the bank of the Yamuna. The settlement on the Ganga, therefore, should have taken place in the post-*Ṛigveda* phase. But even the Bikaner sites on the Sarasvatī and Dṛishadvatī, which marked the earlier home of the Aryans before their entry into the Ganga-Yamuna plains, have yielded the Painted Grey Ware ceramic. Here again, the Painted Grey Ware is the only ceramic *ensemble* other than the

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earlier Harappan and pre-Harappan remains. These factors again are significant in the endeavours to equate the Aryans with the Painted Grey Ware, as well as to assign it a date.

(iv) *Possession by the 'Conquerers' of Weapons superior to those of the Harappans*

By a logical extension of the conceded possibility of the Aryans bringing no pottery tradition of their own or material equipments of any kind, they should be, strictly speaking, deprived of even their weapons. But the fact of history is against such a possibility. As successful settlers in 'fresh fields and pastures new' they could not but be fully armed, naturally, in the tradition of the home or homes in which they had previously lived. The natural sense of superiority of their fighting equipment would instinctively dissuade them from accepting anything in the order inferior to their own. But for the possession by the conqueror of a superior fighting equipment, the forlorn skeletons in Mohenjo-daro, with the slashes of the swords cut deeply into the bones, would not be explicable, notwithstanding the other marks of desertion and desolation.

Of the mass of armour, that they must have brought with them, there is hardly anything found. The bronze equipments with West Asian affinities, circumstantially attributed to their contemporaries, are the only ones to suggest a link indeed with the West for the moment, and they cannot, with certainty, be attributed to the Aryans either. But there can be no doubt that they did bring some armour with themselves. The absence of evidence, either in respect of copper or bronze or even of iron, does not prove or disprove any probable theory, considering the extensive damage that these objects can suffer from oxidation or decomposition, not to speak of the inadequacy of exploration.

(v) *Improbability of a retrograde Appeal to Weapons of Copper in Preference to known ones of Bronze and, even, Iron proves the Point*

That the material equipments of the conquered did not interest them, nor inspire them to adopt or introduce anything superior or even equal or alike, is amply clear from the accumulative archaeological evidence of the subsequent periods. The end of the great civilization was marked by a reorientation of tastes that no longer revelled in the urban delights of Harappa, Mohenjo-daro, Lothal or Kalibangan. The circumstances speak for a supreme indifference to material life. Nevertheless, it cannot be accepted that the Aryan successors of the Harappans

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penetrated as far east as Ranchi in Bihar to evolve a flourishing industry of copper after their own experience, admittedly of bronze and, as will be shown, of iron, which should have been superior to the bronze equipments of those whom they can be taken to have succeeded if not defeated in battle.

(vi) *Source from which Iron was adopted by the Users of the Painted Grey Ware*

The association of iron with the Painted Grey Ware, and, therefore, with the Aryans has been seen. The question that remains to be answered is whether iron was discovered in India or the Aryans had a reasonable chance of being acquainted with it while still on their way, away from India. The question is more complicated than it sounds, for it is bound up with the emergence of iron in the old world, especially in the Near East, and the larger question of the movement of the Aryans from their ancient home and possible contacts between the two. If it could be shown that the Aryans had come into contact with iron at any stage of their peregrination prior to their emergence within the bounds of the subcontinent, it could be reasonably inferred that it should have been possible for them to arrive with an idea of its efficacy as well as its technology, if not actual specimens of objects in this metal. In any case it would but take them some time to settle down in the new land, look for the ores and start manufacturing objects of iron on their own. In such a situation they would owe it to themselves, as agents of an earlier tradition, in so far as it affected India, and at a much earlier date than when the Persians could have brought it to India as a gift towards the end of the 6th century B.C., or, in the alternative, they should have evolved it themselves in India. On the present showing, however, they should surely have started smelting and manufacturing iron objects in India some time before *circa* 800 B.C., and the possible source from where iron was adopted lay, in all likelihood, in West Asia.

B. Advent of Iron in the Ancient World

(i) *General*

To decide the question of its possible inspiration from West Asia it would be necessary to trace its evolution in that region, as a connected event in the technological advancement of man, as well as to find the older traces of the Aryans themselves in the neighbouring lands. It is indeed difficult to trace fully the evolution of iron in antiquity, for more than one reason. Firstly,

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the evidence as yet is too scanty, and, secondly, there is many a lacuna in the way of weaving a fully connected account. An endeavour, however, will be made to present the main outlines of the archaeological evidence on the antiquity of iron[6] in the old world, especially in the Near East, in its bearing on its inspiration and influence in India.

It is perhaps not possible to pin down in antiquity the earliest discovery of the process of extracting iron from its ores by smelting[7]. It is generally admitted, however, that the successful smelting of iron ore was achieved as a result of the earlier and longer tradition and experience of smelting copper, which emerged earlier in human use in general than iron.

Coghlan writes that there are three important factors in the production of iron by the direct process. These are as follows:—

"(a) The ores to be smelted must be sufficiently protected by the fuel bed against rapid oxidization which would be caused by contact with an excess of iron.

(b) Some sort of a smelting furnace is required. The furnace may be with or without induced draught.

(c) The furnace temperature must be high enough to enable the metal to reach a semi-fused or plastic condition so that a workable bloom be obtained"[8].

He further states that some of the early pottery furnaces, such as those that produced the Tell Halaf pottery, could achieve the temperature of 1000-1100° C., and these may have played an important rôle in the early smelting of iron.

Professor William Gowland[9], however, found that the simplest process of producing malleable iron from its ores was with a charcoal fire[10], and secondly, that the temperature needed to reduce iron was only 700-800° C., while the temperature that was required to smelt copper was about 1100° C. It was not, therefore, difficult for those experienced in copper smelting to reduce iron ores at a lower temperature.

Coghlan points out, however, following Richardson[11], that even though it is possible to extract iron from ores at temperatures ranging from 700° C. to 880° C., in the form of small solid grains, the resultant smolten liquid[12] obtained at the temperature range of 1000°C. to 1150° C. becomes really suitable for working and forging. At any intermediate temperature the smelt remains in a comparatively unforgeable state.

It is indeed tortuous to trace the evolution of iron-smelting furnaces, in view of the limited archaeological evidence, which, if at all recognized, is often inordinately mutilated. It may be incidentally mentioned that it has been possible to infer that

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there were three different types[13] of early furnaces, namely, (a) the simple bowl furnace, (b) the domed furnace, and, (c) the shaft furnace.

As regards the antiquity of the use of metallic iron obtained as a result of the smelting of iron ores, the archaeological evidence takes it back to the 3rd millennium B.C. The evidence is summarized below.

(ii) *Iraq* (*Mesopotamia*)

The earliest datable evidence is provided by a fragment of man-made iron at Tell Chagar Bazar[14] in north Syria in level V, dated by the excavator to *circa* 2700 B.C. Two fragments of iron from level III were dated to *circa* 2500 B.C.[15] These incidentally indicated that Habur was a very early centre for the working of iron.

An iron blade with a bronze hilt was found at Tell Asmar in Iraq and dated by the excavator between 2450 and 2350 B.C.[16]

A bronze blade with an iron hilt from Yorgan-tepe from the Hurrian Period, 1600-1375 B.C.[17], and a fragment of iron from Mari near the remains of the pre-Sargonid temple of the Ishtar[18] and iron tools and weapons of the Kapara period from Tell Halaf[19] provide the evidence of the use of iron in the 2nd millennium B.C. in Iraq.

Though Tighlath Pilesar[20] (1120-1100 B.C.) takes pride in killing four buffaloes in the Mitanni kingdom with his bows and iron spear, he had laid the pathway for his troops with bronze shovels and axes. This only indicates the still limited uses to which iron was then put.

By the time, however, of Sargon II, (721-05 B.C.) iron had come very much into vogue, and objects of iron were found in large numbers.

(iii) *Syria*

In Syria iron was rare before 1500 B.C., but after the middle of the 2nd millennium B.C., the evidence was larger, but the true iron industry began between *circa* 1300 and 1200 B.C.[21]

A battle axe made of an iron blade (fig. 22) with a bronze grip found at Ras Shamra[22] has been dated by the excavator from the end of the 15th to the first quarter of the 14th century B.C. It is perhaps the most crucial evidence that has come to light. Its analysis by Mon. Brun[23] established its character as man-made iron. The use of other metals along with the blade indicated that iron, being a precious metal, was used economically. The presence of the figure of a boar on the *poignard* is sought by the excavator to be explained as the result of its

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manufacture and use by a non-Semitic people, as this animal was abhorred by the Semites. It is, therefore, attributed to the Mitannians of the north-eastern regions of Syria[24].

According to the excavator the above-mentioned conclusion is confirmed by the find among the Tell-el-Amarna Letters of an epistle[25] from King Dushratta of the Mitannians addressed to Amenophis III (1415-1375 B.C.). The document enumerates the gifts at the wedding of princess Tadu-hepa with the Egyptian king. These include objects made of a metal called *parzillu* (translated as iron) such as bracelets.

Another letter of the same king of Mitanni mentions bracelets of a similar type as well as a dagger of which the blade is rivetted with gold. The same letter mentions blades of daggers made of a metal called *habalkinnu* which is translated by Knudtzon as steel. The find of a steel-bladed dagger in the grave of Tutankhamen confirms the correctness of the translation of this word. The word may have an ethnic inspiration and may point to the Chalybes[26], dwelling in the south of the Caucasus.

Schaeffer is of the view that it was the Mitannians[27] who were the first users and producers of iron, and it was through them that it passed to the Egyptians and other people of the Near East. After the conquest of the Mitannians by the Hittites, the trade in iron passed into the hands of the latter. It is indicated by the letter of Hattusilis III to another king, differently identified as either of Assyria[28] or Egypt[29].

The cuneiform texts[30] found at Boghaz Keui, Turkey, point to the ample use of iron by the Hittites during the 14th and 13th centuries B.C. Schaeffer[31] recalls the similarity between this composite axe, which he calls as the oldest known axe of iron, with a dagger sculptured among the reliefs in Yazilikaya, near Boghaz Keui, of Mitannian origin. It was the possession of the knowledge of iron which had made possible the conquests of the Mitannians between 1600 and 1400 B.C., when they dominated the Near East including Asia Minor, where the Hittites dwelt and later dominated.

In addition to the evidence from Ras Shamra, a gold-plated iron amulet of the period of Amenhotep III found in a royal tomb at Byblos[32] seven objects of iron, six of which were gold-plated, mentioned in the inventory of the temple of Ninegal at Mishrife-Qatna[33], destroyed by Suppiluliuma (14th century B.C.), dated prior to Thotmes III, i.e. *circa* 1501-1447 B.C., and beads and iron rings from Minet-el-Beida[34] provide the evidence of the use of iron in Syria in the 2nd millennium B.C.

The Bronze Age in Syria was brought finally to an end by

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the destruction of the city of Carchemish on the Euphrates by the users of iron from Asia Minor in the 13th century B.C. By about 1100 B.C., the cemetery began to be filled with objects of iron ushering in the full-fledged Iron Age.

Schaeffer[35] has pointed out that the levels in which iron objects have been found at Hama are to be dated to *circa* 1450-1100 B.C.

O. Johannsen[36] has divided the ancient settlers of Byblos, Sidon and Tyre into seafarers, merchants, colonists, miners and smelters. He has referred to the discovery of a gold ring at Byblos, with iron ornament dated to *circa* 1825 B.C., and to a copper plate inscription (2000-1500 B.C.) in which the scribe wrote that he had worked with the *"teeth of iron"* for the ornamentation of an Egyptian temple at Byblos. These would, no doubt, point to very early dates of the use of iron in Syria, but not to its manufacture, though such a phenomenon, in a limited scope, was indeed possible.

But after 1200 B.C., when the Hittites settled in Syria, the manufacture and use of iron in the region became very common.

(iii) *Turkey (Asia Minor)*

Iron does not seem to have appeared at Troy prior to period VI, in the 12th century B.C.[37] Georgia and Armenia did not possibly have iron before 1200 B.C. Nevertheless, Asia Minor has been the most fruitful ground for the development of the iron industry in ancient times. The archives of the Hittite empire found at Boghaz Keui, the capital, throw ample light on the use of iron in the empire from the 20th to the 13th century B.C.

The earliest document found here relates to king Anittash of Kussara who ruled about 1950-1925 B.C. One of the statements attributed to him declares that Purushanda, a defeated prince, brought with him one throne and sceptre of iron, as ordered[38].

But O. R. Gurney[39] considers the statement to be anachronistic, and, therefore, of doubtful character. Even if it is assumed that this evidence alone is not enough to prove the point, there can be no doubt about the existence of a developed iron industry in Asia Minor in the 14th century B.C., with beginnings laid still eariler.

There are several other inscriptional references to the use of iron in Asia Minor in the Hittite period prior to *circa* 1200 B.C. One inscription[40] describing the rituals for the foundation of a temple refers to the sources from which various metals such as iron, copper and bronze were brought. Iron, described as the black metal, came according to this record from heaven. It might bear an indirect reference to the meteorites which marked the earliest form of iron known.

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An exotic dagger with an iron blade found in the tomb of Tutankhamen[41] (*circa* 1350 B.C.) has been thought to be of Hittite workmanship as the Hittite king Hattusilis III[42] wrote to an Egyptian king, presumably Rameses II (1292-1225 B.C.), in respect of the supply of iron objects. The letter purports to say,[43] "As to the good iron about which thou hast written to me: there is no good iron in my 'sealed house' in Kizzuwatna. It is a bad time to make iron, but I have written (ordering) them to make good iron. So far they have not finished it. When they finish it, I will send it to thee. Behold now, I am sending thee an iron dagger-blade.... which thou hast sent have no blades..... (I have ordered blades) to be made, but so far, they have not finished them."

The addressee of the above-mentioned letter has been suggested to be Shalmaneser I of Assyria[44].

This passage has been interpreted to suggest that the metallurgists of Asia Minor enjoyed a monopoly[45] of the production and supply of iron in ancient times and that it was a royal monopoly. Iron was considered also to have been produced in large enough quantities so that it was required to be stored in bond houses.[46] The position of the Hittite monopoly of iron has been assailed by Przeworski[47].

Notwithstanding the divergence of the interpretation, there is apparently no dispute about the date, i.e. the 13th century, and the manufacture, storage and export of iron objects on a scale which was apparently fairly large in Hittite Asia Minor.

Emanuel Laroche has brought together all the epigraphical evidence on the use of iron among the Hittites from about the middle of the 2nd millennium B.C. till the break-up of the Hittite empire in about 1200 B.C. in a neat little study of the problem[48]. His researches indicate that during the hegemony of the Hittites iron was better known in their empire than in the rest of contemporary Orient.

The references include the mention of a word *AN Bar Mi* meaning black iron of heaven, which is, however, less frequent than the other words. The objects mentioned in the inscription display a wide variety consisting of ornaments of idols (*Susa*), a seat (throne), a sceptre, plates for engraving inscriptions, statuettes of men (*Alam LU*), statuettes of women (*Alam Sal*), statuettes of young girls (*Alam Duma Sal*), figurines of bulls (*Gud Mah*) or cows, lions (*Ur Mah*), pedestals (*Palzaha*), diverse ornaments, weapons and tools, objects utilized in the rituals of magic as well in feasts. The diverse assemblage includes lances, sceptres, nails and pins. The ritual of foundation enumerates the component objects comprising the places, the tables and a door,

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A tongue of iron is stated as sanctified by the mouth of the king and queen. Iron is described in these inscriptions as a symbol of strength and force, and is frequently cited in comparison.

This evidence led Laroche to conclude that if iron was not a frequently-used metal in Anatolia during the 2nd millennium B.C., it was not limited to ornaments and arms. Divine statuettes and lances of the guards were indeed produced by the Royal Service, but a rich Hittite could easily acquire it in the course of ordinary commercial business. Iron was at this time an article of luxury.

Though iron may not yet have supplanted the other metals and established its position as the principal metal in the life of man, its manufacture and use, howsoever limited in extent in comparison with the objects of other metals, are amply attested.

Though the Hittite monopoly of the manufacture and distribution of iron objects or their claim to the discovery of the technique of smelting and hardening iron have been questioned, it can, nevertheless, be conceded that the manufacture of hard iron was mastered by the Hittites as early as the middle of the 15th century B.C., as many iron objects of that period have come from Asia Minor[49].

Schaeffer[50] has drawn the attention to a text mentioned by Hamit Bey, the Director of excavations at Alaca Hueyuek, from Kuel-tepe, which speaks of a metal, which, between 2000 and 1950 B.C., was five times as dear as gold and fourteen times as dear as silver. This would probably mean iron as suggested by Schaeffer. The discovery of objects of iron, of which a dagger was of large dimensions, shows the occurrence of iron at this date, though indeed as a rare phenomenon.

Schaeffer expressed the view that it was probably the metallurgists of Asia Minor that were the first producers of iron in *large* quantities.

It may be recalled that a band of Hittite invaders had destroyed the second city of Troy by about 2400 B.C. After a short time, towards the end of the 3rd millennium B.C., or a little later, fresh invaders destroyed the city and moved to the grassy plains of the Halys basin, and laid the foundations of a Hittite empire. One of the earliest rulers was King Anittash of Kussara, who won a victory over Pijusti, the ruling king of the land called Hatti. Anittash ruled between 1950 and 1920 B.C. The conquest meant the settlement of a new people, who, with vicissitudes of fortune, lived in the land till 1200 B.C., when it was conquered by a people called the 'Sea folks', the Thraco-Phrygians, and the Hittites were driven before them from their home of over 700 years. The destruction of the Hittite empire was followed by the flight of

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the Hittites and the consequential dispersal of their processes of iron workings to the surrounding and adjoining countries, namely, Iran, Trans-Caucasia, Syria, Palestine, Cyprus, Mesopotamia, Caucasia and Crete. It must not be imagined that the other countries had no knowledge of iron prior to this revolutionary movement. A process with which the contemporary world was differentially acquainted already got accelerated, and the pace was set for the spread of iron metallurgy over widely separated parts of the world.

The possibility of the Hittites having monopolized the manufacture and distribution of iron objects for a while, if not making the discovery, cannot be ruled out in view of the occurrences of important iron mines in Asia Minor and amid the Taurus mountains and the Armenian and Caspian ranges, besides the adjoining regions of Persia[51]. Some of the areas which came to be included later into the Hittite empire had been previously under the occupation of the Mitannis, to the north of Syria, whose claim to an early mastery of the technique of manufacturing objects of iron has already been mentioned.

(v) *Palestine*

The occurrence of an iron ring and two iron axe-blades found at Gezer[52] in Palestine, dated to *circa* 1500-1400 B.C., and a tool with an iron handle from Tell-el-Muetsellim III (Megiddo)[53] practically constitute the earliest evidence of the use of iron in Palestine in the middle of the 2nd millennium B.C.

G. E. Wright[54] concluded that iron was introduced into Palestine in the late 12th and 11th centuries B.C., on the basis of datable iron objects found at Tell-el-Farah, Beth-Shemesh, Gezer, Tell-el-Hesi and Tell-el-Ful, though it is likely that iron had come into Palestine towards the middle of the 1st millennium B.C.

Johannsen[55] points out that the deadliest enemy of the Jews were the Philistines, who had settled in south Palestine about the 12th century B.C. A pre-Philistine cemetery, dated 1165 B.C., shows only bronze objects. But the graves of the Philistines have yielded iron.

The evidence at Gerar[56] in south Palestine shows iron to have been a common metal there during the XIXth Egyptian dynasty i.e., *circa* 1300-1200 B.C.

The evidence of some iron objects from Lachish (Tell-el-Duweir)[57] point to a similar date, though slightly earlier, say, 1100 B.C.

These and many other data on the use of iron in Palestine

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point to its comparatively later emergence in the region than in Asia Minor or Syria.

(vi) *Crete*

Iron was known in Crete towards the end of the 2nd millennium B.C. Slags derived from oxidized ores from the great Tholos of Hagia have been referred to by Przeworski[58]. Iron was at this time both costly and was imbued with magical powers.

Ornaments of iron dated to *circa* 1500-1200 B.C. have been found at Phaistos, Vaphio, Kakovatos, Asine and Mykenae[59]. These include objects like finger-rings of iron[60]. As no useful deposits of iron ore are known in Crete, the iron industry in Crete was likely to have depended upon imports of ingots, turned to advantage by smelting and forging. The find of slags would lend support to such an inference. As a matter of fact an ingot[61] of iron was found by J. Forsdyke in a tomb at Knossos, dated to *circa* 1800 B.C.

(vii) *Cyprus*

Schaeffer[62] holds the period 1250-1050 B.C., as the one marking the end of the Bronze Age and the beginning of the Iron Age in Cyprus. The evidence is contained in the objects of iron occurring in tombs, such as at Enkomi.

(viii) *Egypt*

Peculiarly enough, some of the evidence of the early use of iron in Egypt has to be discounted in view of their meteoric origin. Man-made iron did not make its appearance in Egypt until quite late in her history, as she, apparently, found it convenient to import it rather than manufacture it herself. Nevertheless, man-made iron was known to Egypt well enough during the New Kingdom, i.e., after 1400 B.C., as the evidence of the tablets at Tell-el-Amarnah, referred to before, would show.

The oldest evidence of iron occurs in the cemetery of El Mahsana[63]. Recently the evidence of iron objects at Buhen in Nubia[64] has taken the antiquity back to before 1000 B.C. The Pharaohs indeed got their earliest iron from this region. In fact, an inscription of the 19th century B.C. speaks about a mission to import raw iron ore and gold from Nubia[65].

In El-Gerzeh[66], a tomb of the Pre-dynastic period has yielded the evidence of an iron necklace. The Pyramid of Cheops[67] of the IVth dynasty has yielded evidence of iron, dated to *circa* 2900 B.C. A grave near Abydos[68] of the VIth dynasty (*circa* 2500 B.C.) has revealed specimens of nickel-free rusts of iron. An amulet

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of meteoric iron is reported from the XIth dynasty (2160-1788 B.C.)[69]. The tomb of Tutankhamen[70], dated to 1360 B.C, has shown several objects of iron comprising (i) 16 miniature chisels, (ii) a head-rest, (iii) a dagger with a golden grip, and (iv) two amulets.

It is extremely interesting to note that the colour of the tools and weapons in the painted hieroglyphics[71] are depicted upto 1200 B.C., either in yellow (gold) or red (copper or bronze) but thereafter the colour was suggestively changed to blue, the colour of iron or steel. This evidence, in the background of the Tell-el-Amarnah letters, would lead to the conclusion that iron used in Egypt prior to *circa* 1200 B.C. was largely imported, and thereafter locally manufactured[72].

(ix) *Greece*

The evidence of the use of iron in Greece is provided largely by the finds in the royal tombs at Dendra[73], dated to the 14th-13th centuries B.C. Iron came to be used commonly in ancient Greece with the Pre-geometric period, following upon Mycaenean time, i.e., after 1200 B.C.

(x) *Iran and the Caucasus region*

(a) *Views of R. Ghirshman vis-a-vis those of C. Schaeffer in their Bearing on the Chronology and Source of Iron in Iran.*— The evidence on the use of iron in Iran including the Caucasus region is indeed very crucial in a study on the emergence of iron in India as it bordered on the Indo-Pakistan subcontinent on the one hand and lay immediately to the east of Asia Minor and upper Mesopotamia, the cradle of iron industry in the 2nd millennium B.C., on the other.

Though there is no doubt about the stratigraphic horizons in the early history or archaeology of Iran, where iron occurs, there is considerable difference of opinion as to the chronological estimates of the levels themselves. R. Ghirshman[74] points to the phenomenon of the destruction of the city of Hissar as having taken place either towards the middle of the 2nd millennium B.C. or towards the end of the second or the beginning of the first.

To quote his own words, "If it is dated to the middle of the 2nd millennium the cause of this destruction could be attributed to the movement of Indo-Europeans described above. If it is brought down to the last centuries of the same millennium, it may be that the cause was a new wave of Indo-Europeans, this time bringing the Iranians on to the Plateau"[75].

He thus concedes the possibility of two main Indo-European

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waves penetrating into Iran, the first one coming about the middle of the 2nd millennium B.C., about the same time as the bifurcation of the branch that went ahead and settled in India, and the second, apparently unconnected with the first, about 1000 B.C.

Before the advent of the first wave, the ceramics of Iran were influenced by the Hurrian ware of Mitanni, but, as a result of the intensified rivalry between Babylon and Assyria about the 13th and 12th centuries, this influence ceased to flow. A new wave dominated by the grey-black or black ware pottery began to make its weight felt. It was possibly the result of peripheral tribes pushing into Iran from the north and north-east as a result of an external pressure. It displayed itself in Sialk V Cemetery A. But soon it was replaced by a new culture, that of Cemetery B. The "culture belonged to the first Iranian tribes who about 1000 B.C. reached the western districts of Iran"[76]. According to Ghirshman, Cemetery A is dated to the 12th century B.C.

Objects' of iron occur in both the cultures, though they are more prolific in B than in A. The objects of iron found in Cemetery B at Sialk[77] comprised utensils, anklets, swords, daggers, shields, javelins, arrow-heads and equipments of the harness, viz., broken bits, head and breast ornaments for the horse (fig. 14).

Notwithstanding the diversity of form of the objects of iron in Iran during the time of Cemetery B culture, it is claimed by Ghirshman that it was not yet the common metal but later became widespread between the 9th and 7th centuries B.C.[78]

There is yet another large source of iron in Iran in early times. This is indicated by the finds of iron objects in association with specialized objects of bronze found at Luristan[79]. Though the association cannot be scientifically proved, the circumstantial evidence would suggest contemporaneity.

The iron objects[80] from Luristan include long iron swords with iron hilts decorated with heads of men or animals, daggers with the hilts representing a human being or the stylized head of an animal, picks and axes, often decorated with animals or parts of animal, arrow-heads, laurel-shaped, conical or trilobal.

Though there are some elements of survivals from earlier cultural milieus, of the 2nd millennium B.C., the bulk of these materials have been dated by Ghirshman "to the eighth or seventh centuries or even later"[81]. At the same time, it is noted that Luristan's cultural connexions with Sialk VI Cemetery B are quite numerous, suggesting contemporaneity. Ghirshman's argument for a late date of the Sialk Cemetery B culture is presented by the evidence of "an imposing structure with door-hinges in the pure Assyrian style of the eighth century"[82] overlying the level

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containing Sialk B type tombs at Tepe Giyan. Ghirshman drew the conclusion "that the partial destruction of these fortified towns (of Iran) was the work of the Assyrian armies and that it took place not later than the ninth to eighth centuries B.C., a period when the Assyrian empire was engaged with all its forces against the rising strength of Iran"[83].

To support his argument about iron not becoming common or widespread until the 9th to 7th centuries B.C., he has pointed to the preponderance of copper or bronze in preference to iron in the B tombs of Sialk[84]. The booties carried by the Assyrian armies contained far less iron than copper, and even as late as the 8th century B.C. the troops of Sargon II were still armed with bronze picks and axes. He also mentioned "that the excavators of the wealthy towns of the kingdom of Urartu found that iron objects were much less common than bronze".

C. F. A. Schaeffer has considered the entire evidence of iron in the Near East (i.e. West Asia), including Iran, comprehensively in his remarkable study on the comparative stratigraphy and chronology of western Asia[85]. He has come to the conclusion that the Iron Age in Iran began towards the end of the Bronze Age, between *circa* 1200 and 1000 B.C. He traces its evolution in and dispersal from Asia Minor[86] where the metallurgists, according to him, were the first producers of iron in large quantities, and, towards the end of the 13th century, it came definitely to supplant bronze for the manufacture of arms and tools in the ancient Orient. One of the prime factors for this phenomenal development all over the Near East is the invasion of the Sea folks[87] into Hittite Asia Minor and the corresponding pressure on folk movements that engulfed the entire Near Eastern world. It was Rameses III[88] who stemmed the tide of the movement of the newcomers into Egypt. The event of folk movements is connected also with the discomfiture of the Kassites of Assyria about 1171 B.C., after a rule of nearly six centuries.[89]

The chronological scheme, beginning with 1200 B.C. for the commencement of the Iron Age in Iran, affects all parts of the country, whether in the north in Koban or in the south, west or east. The round figure of 1200 is according to Schaeffer to aid the memory. He would rather consider that the period from 1250 to 1175 marked actually the events that led to the ushering in of the Iron Age in the Near Eastern countries.[90]

The evidence of Agha Evlar in the Talish basin is considered below. Most of the dolmens exposed here by De Morgan belonged originally to the Bronze Age, but were re-used later in the Iron Age. The objects of iron at Agha Evlar (fig. 13)[91] comprised twelve knives or fragments of knives, arrow-heads, axes,

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brooches, ear-drops, rings, hatchets and daggers, lances and a sword with a bronze pommel.

At Chagoulla Derré[92] as well, the dolmens were used in the Iron Age, and the objects found here (fig. 13) comprised knives, a dagger, bracelets and three javelins of iron. Nevertheless, the evidence shows that the proportion of iron here was less in comparison with the objects of bronze.

One of the fundamental objects, which can be called typically Iranian, is a dagger with a bronze handle (fig. 13). The bronze handle has the shape of a folded fan, and grips the dagger blade as a tongue closing in on it at the top in the form of a crescent[93]. This shape is found at Nihavend as well as at Luristan and also in Transcaucasia. The grip was fixed without any rivets, but, though this feature was no more functional in the Iron Age, it gradually declined and remained only as a relic from the Bronze Age.

The evidence from Tepe Giyan and Tepe Djamshidi[94] in mid-western Iran, in comparable levels shows the occurrence of iron in the form of arrow-heads of laurel-leaf shape, awls and daggers.

Though phase V of the occupation of Sialk, represented by the Cemetery A, contains traces of the occurrence of iron in the form of a small dagger with a narrow tongue, and an awl of square cross-section[95], it does not really belong to the Iron Age proper, which is represented by Sialk VI, as seen in the Cemetery B. Though the proportion of iron increases in this phase at Sialk, Ghirshman is of the view that iron was relatively precious at this time[96].

The evidence of iron from Koban is also dated similarly to *circa* 1200-1000 B.C. by Schaeffer[97].

The basic evidence for the suggested chronological scheme arrived at by Schaeffer is furnished by the seals and sealings found in the levels below the occurrence of iron in Iran. These are made variously of vitreous paste, soft stone, and, rarely, terracotta, and they are distinguished by the symmetrical arrangement of the scheme of figures, consisting of crouching animals turning their faces or a procession of animals[98], recalling the glyptic art of the 15th-14th centuries in Kirkuk[99].

Some seals found at Agha Evlar in Talish[100] are similar to those found at Beisan, contemporaneously with Thotmes III of Egypt (*circa* 1500-1450 B.C.). Similar seals are found in Cyprus, Greece, North Syria and at Kirkuk, near Nuzi in Syria. Tell Brak has produced a specimen which has been dated by Mallowân to *circa* 1450 B.C.[101]

A seal from Tepe Giyan[102] bears resemblance to those from

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Talish and are typologically datable to the 15th and 14th centuries B.C.

The seals at Sialk VI Cemetery B reproduce the subjects of chase or a chariot and offerings etc., reflecting Mesopotamian or Syrian influence[103]. One of scarabées at Sialk VI B bears an epigram of Seti I of Egypt who ruled between 1319 B.C. and 1300 B.C.[104] Even the time-lag of a hundred years would point to a date around 1200 B.C. for its emergence in the region.

It is also to be noted that the similarity of seal types between the Talish Bronze Age in its end-phase and Sialk VI B would only point to a closer chronological connexion between the two[105]. The fact of the absence of cylinder seals in the Iron Age in the Talish region would, however, indicate that it is later in date than Sialk VI B.[106] Ghirshman's lower dating of Sialk VI is based on similarities in the decor of some vases in Sialk V with the Talish basin[107], but since the latter is dated on the basis of seals to the 14th and 13th centuries, a higher date for Sialk VI would be called for.

In spite of Ghirshman's insistence to the contrary Schaeffer sees no connexion between Sialk VI B and the recent Bronze Age in the Talish basin in any of the following objects: daggers, swords, axes, or the ceramic, though some similarity in such simple forms as lances, knives and arrow-heads is noticed[108].

The horseman seals[109] of Sialk VI (fig. 7) have been derived by Ghirshman from Assyria of comparable levels, dated from the 10th to the 8th century B.C. But the other evidence of the seal with the epigram of Seti I would argue against such a conclusion. Besides, it may be pointed out that the horseman seals were a natural product of the soil, as raising of horses was a favourite engagement among the Persians.

Ghirshman also uses the evidence of the absence at Sialk VI B of the type of dagger[110] with handle—with hammered or rivetted wings—as found at Ras Shamra early in the 14th century B.C. and in Luristan in the 12th century B.C. Though the negative evidence cannot be stated as conclusive, the occurrence of varying forms of dagger point to an inspirational connexion and corresponding chronological equation.

It is clear that the final phase of Hissar III C is anterior to Sialk VI B as the former belonged still to the Bronze Age, completely unaffected by iron, but Schaeffer dates it to *circa* 2100—2000 B.C., while Ghirshman dates it anywhere between the middle to the end of the 2nd millennium B.C. The uncertain aspect of Ghirshman's chronology and the definiteness of the phase belonging to the Bronze Age make the dating of Ghirshman difficult to accept[111].

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Circumstantially, however, the date-scheme suggested by Schaeffer for the beginnings of the Iron Age in Iran appears to be nearer the truth, on the following grounds. The foregoing analysis of the evidence on the early use of iron in the Near East, and its development in Asia Minor in the 14th and 13th centuries, as in a cradle-land, leaves no room for doubt about the date of the beginnings of iron workings in the ancient Orient. The invasion of the Sea folks, the Thraco-Phrygians, about 1200 B.C., into Asia Minor resulted in the rapid dispersal of the iron using and manufacturing folks all over the Near East and was responsible for the rapid development of iron industries in the succeeding centuries. It also set in motion a tremendous movement of folks in different directions, and should reasonably be expected to have been responsible for the entry into Iran of the Sialk VI Cemetery B folk.

(b) *Introduction of Iron in Iran owed itself to the Aryans.*— The cranial studies by H. V. Vallois of the skeletal remains from the cemetery[112] have shown the people to belong to the Armenoid group, described by Ghirshman as brachycephalic. Ghirshman calls these people the ancestors of the Iranians, thus recognizing in the people a group of Indo-Europeans or Aryans.

It is very likely that the folk movements and the spread of iron industries was the result of the upheaval in Asia Minor. The question of identifying the new folks as Aryans is, however, fraught with difficulty, though circumstantially such an identification may be conceded. Ghirshman, however, considers the destruction of the Hissar occupation as the result of an earlier movement of the Aryans, though the possibility of a later destruction has not been ruled out[113]. As the last occupational phase, Hissar III C, was an entirely Bronze Age occupation and as at the date assigned to this phase, by Ghirshman, between 1500 and 1000 B.C., iron was known well enough among the contemporary Aryan tribes further west, namely, among the Hittites and Mitanni, it is unlikely that the destroyers of Hissar did, in fact, represent an Aryan people. On the contrary, the subsequent Iranian language and religion, both akin to the *Vedic,* would plead for the equation of the people of Sialk VI with an Aryan movement. The moving force of a pressure from behind caused by the folk movement is also not far to seek.

Ghirshman's argument for a late date for the destruction of the Sialk VI phase in the Iranian towns does not rule out earlier beginnings. This is indicated by the occurrence of cultural objects from earlier periods into the later phase along with newer elements.

Ghirshman has himself pointed to the two most significant

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events in the Near East, especially in Iran, towards the end of the 2nd millennium B.C., namely, the moving in of the Indo-Europeans and the increased and widespread use of iron[114], though that would hardly be a ground, according to him, for a cultural connexion between the two. But circumstantial evidence, in the background of the foregoing discussion, would suggest a close connexion indeed between the two and also plead for the near-accuracy of Schaeffer's date-scheme in preference to that of Ghirshman.

C. Aryan Problem and the Iron Age

(i) *Aryan Problem in General*

The close connexion between the movement of Indo-Aryans and the widespread use of iron in the Near East towards the end of the 2nd millennium B.C. deserves to be examined in view of the evidence in India on the problem of her Iron Age. Such a study would mean the consideration in some detail of the original home of the Aryans and their movements on the one hand, and their contacts or connexions with the iron-using people, on their march, on the other in their bearing ultimately on the relationship between the Aryan movements and the Iron Age in India. The factor of chronology plays, of course, an important rôle in this study.

The problem of the original home of the Aryan speaking people and the course of their gradual movement to different parts of Europe and Asia, especially their final settlement in Iran and India, has baffled solution, and there is hardly any other topic on which more divergent views have been expressed. It is not endeavoured here to offer a solution on the problem, but to state the divergent viewpoints in order to consider how far they are tenable or otherwise, and also to arrive at the probable course and date of the Aryan immigration into India, and to see if in the course of their movement they could reasonably have acquired acquaintance with iron, in its different aspects of either mere use, or the technological processes of its manufacture as well. Archaeologically it would be ideal if epigraphical evidence along with the cultural equipments of Aryan speaking peoples could be discovered over a wide area. The stratigraphy and other internal and external evidence along with epigraphy would then help to fix not merely the chronological position but also the interrelated cultural assemblages on a geographical basis. Comparisons of the cultural milieus against their chronological backgrounds would help to produce a connected account and it would be

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helpful to trace the Aryan speaking people and their geographical distribution in their evolution.

Broadly, there are four groups of Aryan speaking people, namely, the Hittites, Mitannis, Iranians, and Indian Aryans; apart from several others, who have been recognized, and are concerned with the problem in hand. It is possible to work out a picture of their cultural lives either from the archaeological evidence or from the literary, but the interconnexions among one another are not clearly recognizable. In the study of cultures it is to be noted that the cultural nuclei are prone to receiving fresh impulses and influences from the different people with whom they come into contact. There may not, therefore, be any trace of an unmixed and uniform Aryan culture anywhere.

Yet another means of tracing the missing links of the Aryan speaking people is through the study of sister languages evolved from the parental language through their ancient palaeonotological remains, from the point of view of its evolution and development. These may be achieved by studying the modern languages as well, but the study cannot be fully satisfying because the diverse languages in differential stages of development may be removed differentially from the ancient habitat, and the most primitive form of the language need not represent the oldest people and their present geographical location, need not, therefore, be near the ancestral habitat of the parent language. Studies of the problem have given rise to different theories of their origins and expansion[115].

(ii) *Hittites and the Outlines of their History*

The oldest known Aryan or Indo-European speaking people[116] are the Hittites, who moved from an as yet undetermined source, into Asia Minor before 1950 B.C. and settled in a new land called Hatti[117]. The cuneiform archives of the capital city, Hattusa, now called Boghaz Keui (Boghāz Kāḷe in modern Turk), have yielded a mass of evidence on the people of the land. Among the languages spoken by the people eight have been identified and three of them, namely, Luwite, Palaite and Hittite are Indo-European as first propounded by B. Hrozny as far back as 1915[118]. The Indo-European languages spoken by these newcomers belonged to the *Centum* group. The Hittites cannot, therefore, be connected with the *Satem* speaking Indo-Aryans of Iran and India. Whence these people came has been the subject of a controversy that has been raging till this day, being part of the larger question of the original home of the Aryans.

It is now held that the Indo-European linguistic tradition came

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into existence in Asia Minor as far back as the end of the 3rd millennium B.C. One of the first known kings of the newly arrived folks was Anittash, of about the middle of the 20th century B.C. It was a time of independent city states.

Though the archaeological excavations and the cuneiform inscriptions have thrown ample light on the historical aspects of the Hittites, a complete and connected account from year to year, filling out all the details, cannot yet be worked out[119]. Not much, in fact, is known of the period from 1620 to 1440 B.C. From 1440 onwards the information brightens up, and the Hittite empire is seen thereafter to be in conflict with their neighbours in the Mitanni kingdom.

Nevertheless, two imperial periods of glory have been discerned and established. The first or Old Imperial phase lasted between 1740 and 1460, and the succeeding one, called the New Empire, lasted from 1460 to 1190 B.C. As has been stated before, the second Hittite empire was terminated by the onslaught of the Thraco-Phrygians about 1190 B.C. The Hittites themselves were forced to flee. They took refuge in Syria where they set up a new settlement that lasted till 709 B.C., when their last refuge or territory was conquered and seized by the Assyrians.

The Hittites are so called by the Assyrians in their epigraphical references to the folks, after the name of the land, Hatti, which they had made their own home. The script of the Hittite inscriptions was the Babylonian cuneiform, but the main language was the Indo-European Hittite. But the later Hittites of Syria adopted a hieroglyphic script and also a different Indo-European language.

(iii) *Mitannis and the Outlines of their History*

To the east of the Hittite territories, comprising the eastern parts of Anatolia, and the northern parts of modern Syria were the land of Hurrians[120] as mentioned in the Hittite inscriptions. They came into the region shortly before 2000 B.C. The territory can, in fact, be divided into three parts, namely, the Hurri proper in the north, the Mitanni region in the northern parts of Mesopotamia, with its centre in the Habur area, and an area called Azzi-Hajascha to the north of the upper Euphrates. But the ruling house of this vast land was the Mitannis, between the end of the 16th and 14th centuries B.C. The Mitannis, from the names of their rulers, have been adjudged to be of Indo-European extraction. The ruling class, however, was a minority and there is an interlude of several centuries between the emergence of the Hittites in Asia Minor and the appearance of the Mitannis on the scene.

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The history of the Mitanni kingdom is also derived, to an extent, from the documents in Boghaz Keui, the Assyrian and Egyptian records, royal inscriptions, and the Tell-el-Amarnah letters. Parshatar was the founder of the Mitanni[121] ruling dynasty with the capital at Wasuganni[122], which has not yet been identified.

The Egyptian records of Thotmes III about 1483 B.C. makes a reference to the aristocracy of *Maryannu*[123], the chariot warrior bands among the Mitanni, ruling in the land called Naharina[124]. The Mitannians had, in fact, stopped the Egyptian advance at Megiddo. During the rule of Amenophis II (1447-1420 B.C.) Egypt counted Mitanni among her allies. An inscription on the colonnade north of Karnak says that the nobles of Mitanni carried tributes on their heads begging for their lives. At this time the Egyptians captured five hundred and fifty *Maryannu*.

Thotmes IV (1420-1411) married the daughter of the Mitanni king, Artatama I. This lady became the mother of Amenophis III (1411-1375). This latter king of Egypt married Gilu-hepa, the daughter of Sutarna (son of Artatama I), in the 10th year of his reign.

Dushratta, the son of Sutarna, maintained good relations with Egypt[125], and his daughter, Tadu-hepa, was later married to Amenophis III. On his death, his son and successor, Amenophis IV (Akhnaton) married the widow of his father, the lady who is celebrated in history as Nefertiti.

Dushratta was assassinated by his son Mattiwaja. Meanwhile another son, Artatama II, sought the aid of the Hittites, then ruled by Suppiluliuma, to make an attack on the ruling prince. Mattiwaja was defeated[126], but he entered into a treaty[127] with Suppiluliuma, by the terms of which he was to marry the daughter of the latter, and exclude from the accession to the throne of Mitanni all but the descendants of the daughter of the Hittite. The Hurrian domains in the north were given to Biassil, son of Suppiluliuma[128]. The Mitanni kingdom thus entered into a state of vassalage under the Hittites.

This treaty is one of the most important documents of history and was drawn up in two copies or versions. It has been dated to *circa* 1365 B.C.[129], on the ground that Mattiwaja, the Mitannian party to the treaty succeeded Dushratta, who had conducted correspondence with Amenophis III. (1414-1379 B.C.) and Amenophis IV (1379-1365 B.C.) as recorded in the Tell-el-Amarnah letters. The Hittite version was to be kept in the temple of Arnina and the Mitanni copy in the temple of Tesup. As witnesses for the signing of the treaty and as a sefeguard for its maintenance a hundred gods and goddesses were invoked. Among these occur

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the names of *Mitra, Varuṇa, Indra* and *Nāsatya,* clearly *Vedic* gods[130], in the same sequence as in the *Ṛigvedic* text[131]. The Hittite text was discovered by Hugo Winckler at Boghaz Keui in 1906. This helped, more than any other factor, to establish the Indo-European character of the people concerned. This inference was strengthened by the discovery of a Hittite text, on clay tablets, on the training of horses, attributed to a Kikkuli[132] of the Mitanni country, at Boghaz Keui. Though the language of the text is Hittite, the technical (numeral) terms[133] connected with the turns and twists involved in the training of horses[134] were in the Indo-European (Aryan) language. These comprised (the numerals) *aika-vartana, tera-vartana, pañza-vartana, satta-vartana,* and *nava-vartana.*

Besides these clearly Indo-European elements were the numerous personal[135] and geographical names resembling or derived from the Indo-European forms, which point to the existence of a substantial, though numerically small, Indo-European element in the Mitanni population, confined especially to the ruling class[136].

Thus a firm date for the existence of an Indo-European people, about the middle of the 14th century B.C., has been established. No doubt, they moved into this area at least about a hundred and fifty years earlier from elsewhere. From the point of view of language, considering its similarity to the *Ṛigvedic* language, including the word *Nāsatya*[137], in plural, corresponding in form to the dual (*dvanda-samāsa*) form of *Nāsatyau* in the *Ṛigveda,* the people still belonged to a phase when the Indian Aryans and the Iranians were unseparated[138].

It has been held that a band of *condittiori* had separated itself from the parent group and moved into the land of the Hurrians, and founded the Mitanni empire, when the parent stock were still on the march. Considering the fact that they were a small minority[139] of adventurers, it would indeed be difficult to conceive that an even smaller group of these very people moved away subsequently from the Hurrian lands any time between the end of the 16th century and the middle of the 14th, as, *prima facie,* the Aryan civilization of Iran and of India could hardly be the achievement of a handful of people, who could win battles and yet retain their language and religion. Apart from the palpable improbability of such a phenomenon, the fact that the Mitannis themselves adopted the local language, Hurrian, which is neither Semitic nor Indo-European, would argue that the vast intermediate land-mass between Mesopotamia and Iran is singularly devoid of any substantial trace of Indo-Europeanism.

It is indeed true that the Kassites, a people of Indo-European

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stock, ruled in upper Mesopotamia for nearly six hundred years upto 1171 B.C., but could lay claim to their Indo-European extraction only on the basis of the names of Shuriash[140] (*Sūrya*=sun), Marutash (*Marut*=wind) and Buriash (*Boreas*, the Greek god)[141]. They adopted the language as well as the material culture of the local inhabitants.

During the heyday of Mitanni rule there was, besides, no provocation for an exodus of militarist or adventurous nature.

It would, therefore, be wrong to trace the Aryans in India to a later immigration from among the Mitannis of Syria[142].

Since the parallelism of language and religion, howsoever limited, is a fact, it would perhaps be more correct to state that they (the Mitannis) had separated themselves from the parent stock at a time before the bulk of the population moved away towards India. This should have happened before the beginning of the Mitanni dynasty in Syria. At the same time it is to be recognized that the way of life, involving the working out of a pantheon, at least to the extent to which the four deities mentioned in the Boghaz Keui text were concerned, had been completed, and their association was firmly rooted in tradition to be transmitted in an identical order or sequence of precedence, centuries later, to the *Ṛigvedic* text. There is nothing peculiar about the chronological distance of the 'echo' as, even in the subsequent centuries, reliance was placed with success on the powers of trained and ordered memory to retain and transmit the religious lore, rituals, hymns and philosophical verses from generation to generation.

That the language of the Mitannis, in the limited relics preserved, represented a phase in the life of the Indo-Europeans, before they became differentiated into Iranians and Indo-Aryans, is indicated by (i) the numerals, (ii) the names of the *Vedic* deities, who find place, except perhaps Varuṇa, even in the modification of the later reformed religion of Iran, and (iii) the unchanged form of the 'S' sound in all the names. Under the circumstances some land outside of both the Hittite and Mitanni domains has to be thought of for their spring-board before the bifurcation. Both Asia Minor and Mesopotamia (Iraq) are, therefore, ruled out from the consideration in hand. The early emergence of the Hittites in Asia Minor would indicate that the separatist movement from the parent stock had started well before the end of the 3rd millennium B.C.

The close connexion between the Mitannis and Hittites with the manufacture of objects of iron, to the extent of both enjoying a monopoly in the trade in succession, has been discussed above. Their rôle in disseminating the knowledge and technique, especially that of the Hittites, over the whole of western Asia

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reaching up to the borders of the Indo-Pakistan subcontinent, has also been indicated. This leads directly to the evidence of the Aryan movement into Iran.

(iv) *Aryan Problem and Iran*

The views of R. Ghirshman on the immigration of an Indo-European people into Iran (see map in fig. 12) have been mentioned before. He recognized, in fact, two movements, the earlier being identified with the destroyers of Hissar III C culture and represented possibly by the culture of Sialk V Cemetery A. The second wave recognized by him in the culture of Sialk VI Cemetery B should have proved the more lasting and introduced the true Aryan or Iranian culture into Iran. The date assigned by him to this cultural wave is 1000-800 B.C., though Schaeffer has pleaded for a more anterior chronological range. Behind any folk immigration must be a provocation. The arrival of the Thraco-Phrygians in Asia Minor heralded widespread movements of people all over the ancient Near East, and, as has been shown above, such a pressure must have resulted in the arrival of the Aryans into Iran after 1200 B.C. The earliest movement, if at all of Aryan inspiration, had no lasting effect in Iran and need not concern the problem in hand. There is no suggestion of a provocation either at the earlier date. The second movement buttressed up by parallelism in both language and religion with the *Vedic* is of primary importance in this study, and it had at least the provocation of a pressure from behind of a powerful group of fighting folks. The provocation which is firmly dated, also defines the chronological standpoint.

The Indo-European Kassites who had infiltrated into northern Iraq, in the post-Hammurabi period, have already been referred to. That they never became culturally strong or impressive is quite clear. They were hurled down from their ruling position about 1171 B.C., when the Assyrian power came fully into its own.

It was, however, in Iran that the Indo-European people made themselves felt effectively. Ghirshman holds the view that the original common home of the Indo-Europeans was probably in the Eurasian plains of southern Russia[143]. They split themselves into two groups or branches, called the western and eastern branches, respectively. The western branch rounded the Black Sea, the Balkans and entered into Asia Minor across the Bosporus and signalized themselves in history as Hittites.

The eastern branch moved on eastwards, but one group, consisting mainly of the warrior element, crossed the Caucasus and pushed on as far south as the Euphrates and founded the kingdom of the Mitannis.

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Yet another group[144] of these warrior-horsemen moved along the folds of the Zagros and penetrated into the region to the south of the great caravan route into upper Mesopotamia, and came to be assimilated by the Kassite people.

But the main eastern branch[145] kept on moving and slowly crossed Transoxiana and the Oxus and, after a short stay in Bactria, crossed the passes of the Hindukush and descended along the Pandishir and Kabul rivers and entered into Iran.

The Iranians[146], however, who came later from the region of Transoxiana, were unable to spread further eastwards towards the Hindukush as this region had been already under the occupation of the Indo-Aryans, who had settled there at the time of the earlier Indo-Iranian invasion. They turned, therefore, from Bactria westwards towards the heart of the plateau of Iran.

The Iranian movement is thus attempted to be shown by Ghirshman to be secluded and separated from the Indo-Aryan movement, which should also explain his chronological scheme. Under this interpretation the connexion between the Iranians and Indo-Aryans is not apparent, though such a connexion should have existed before the alleged breaking away of the Indo-Aryans from the region of Transoxiana. Such apparent contacts between the two people as are indicated by linguistic parallelisms and religious schism between Iranian and Indo-Aryan should be attributed to this period of unbroken common existence.

Ghirshman hesitantly attributed the destruction of Hissar III C to the earlier Indo-European movement and also the introduction of Sialk V Cemetery A culture to this movement. But the cultural disparity between Hissar III C and Cemetery A on the one hand and Cemetery B on the other, and the discovery of a hitherto unknown new ethnic type in Cemetery B on the soil would preclude any connexion between the earlier movement and the later, and would make it difficult to explain so easily the dispersal of the main ethnic group, if it was indeed the earlier of the two. It stands, therefore, to reason to deduce that the entire movement was integrated, up to a point, and that the Indo-Aryan element separated itself from the Iranian in Iran, or before the Iranians marched into Iran, shortly after 1200 B.C.

A plausible course of events in Iran towards the end of the 2nd millennium B.C. is indicated by the appearance at Giyan I and Sialk V Cemetery A of a grey-black[147] or black pottery, not previously known there. This is constructed as the result of the pressure of an invading folk from further north, as the grey-black pottery was already known in Hissar in the 3rd millennium B.C. The invader is ultimately recognized in Sialk VI Cemetery B, the cultural assemblage in which points to a departure from the

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life of the earlier days. The culture of Cemetery B at Sialk VI is also identical with that of the Luristan type of graves at Giyan I.

The excavations at Khurvin, near Tehran, have shown, however, that the two cultural phases represented by Sialk V A and Sialk VI B, respectively, are introduced with a stage of overlap between the two[148].

To trace the contacts and mutual influences between the Iranians and Indo-Aryans, if any, on Iranian soil on the one hand, and the Hittite or Mitanni on the other, it would be worthwhile to consider the material remains of the Iranians of comparable or connected time-scale. These comprise, representatively, the objects found at Hissar III C., Sialk V A, Sialk VI B and Luristan.

It may be observed that Ghirshman is not sure about the date of the end of Hissar III C[149]. The excavator had dated it to the first half of the 2nd millennium B.C., towards the end of the Copper and Bronze Age, with a possibility for a still earlier date. Schaeffer would date it, however, to *circa* 2100-2000 B.C. It is significant that Hissar III C has yielded no objects of iron, though the Cemetery A of Sialk VI has produced several. Under the circumstances, the attribution of the destruction of Hissar III C to an Indo-European movement seems to be of doubtful value.

The cultural complex of Sialk V Cemetery A is characterized by a simple interment of the contracted body in a pit to the accompaniment of grave goods comprising a diversity, alike of ceramic wares and types and bronze equipments, among which two objects of iron have also occurred (fig. 14).

The main ceramic wares of Sialk V are (i) a grey-black-ware, (ii) a plain red ware, (iii) a painted ware of yellow to greenish colour, and, (iv) a red ware. The types of vessels provide a large variety. The grey-black ware is similar to the ware found in Hissar III C, Shah-tepe and Turang-tepe and, in fact, to a ware occurring in corresponding periods in central and north-east Iran and Transcaucasian areas.

The painted ware, which is rough, porous, hand-made and not burnished, has parallels in Alishar III, Kuel-tepe and Boghaz Keui in Asia Minor towards the end of the New Empire period. Though the other equipments are mostly of bronze, two pieces of iron, namely, a dagger and a small awl (fig. 14) respectively, suggest the acquaintance of Iran with iron in this phase. The lances[150] of bronze have parallels in Boghaz Keui to indicate perhaps the source of inspiration.

Sialk VI, represented by the Cemetery B, is separated stratigraphically and culturally from the earlier Cemetery A. The duration of the hiatus, if at all, between the two is indetermi-

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nable, though it cannot be very long as indicated by the overlap at Khurvin.

Sialk VI B is distinguished primarily by an elaborate funerary ritual. The bodies were lowered into a pit measuring from 1.75 to 2 metres in length, varying in width from .7 to .8 metres. The sides of the pit were not lined with slabs. But the tumulus was surrounded by an enclosure or girdle of slabs, usually, of stone, or, occasionally, of terracotta, in combination with sun-dried bricks. One of the slabs carried a circular or squarish perforation, obviously the port-hole, as of the megalithic slab-cists. The pits were oriented north-south or east-west. The bodies, mostly in singles, were laid in an embryonic position, laid on the right or left side, with hands folded on the chest or abdomen. In a few cases multiple or family burials in succession have been known. The funerary furniture was laid in different positions around the body and comprised a large equipment of vessels of terracotta as well as of metal, weapons and tools of bronze and iron, ornaments of gold, silver and bronze, objects of toiletry and beads.

The pottery of Sialk VI B[151] is strikingly different from the ancient ceramics of India, save for the limited evidence of channel-spouted bowls found occasionally in the chalcolithic cultures of west-central India, which was probably the result of some contacts. The ceramic assemblage consists of (i) the black or grey-black, (ii) red and (iii) dull red or drab wares. These, excluding broadly the grey-black ware, are often painted. The painted designs are confined mostly to bowls and jug-like jars. The most distinctive ceramic type, which spread far and wide in Iran, was the bowl or vase with a large loop-handle and a long channel-spout, richly painted. It was used for libations at burials. The other shapes comprise (i) jars, ring- or disc-footed or flat-based, some with a wide mouth, a loop-handle and a pressed fan-shaped spout on the shoulder, (ii) bowls and (iii) composite jars, forming groups of three joined deliberately in the course of firing together. A flattish flask, with a narrow neck and small loops on the side in grey-black ware, was a utilitarian pot (fig. 21), with parallels in the cairn-burial pottery of Pakistan (pl. II) as has been mentioned before. The painted designs, executed in black, are either (i) geometric or (ii) interesting treatments, often in combination, of men at fight, ibexes, horses or the popular solar disc symbol. The geometric patterns, arranged in zones or panels, consist of chess-board chequers or a row of conical triangles and the like.

The cultural links, if any, between the Hittites or the Mitannis or between any of these with Sialk V or VI are not recognizable,

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except in the matter of the emergence of iron in Iran, especially in the phase of Cemetery B of Sialk VI.

The presence of iron in Sialk V and its larger occurrence in Sialk VI have been noted. These evidences prove the early emergence of iron in this area. Ghirshman says,[152] "The increased use of iron during the first millennium had a far-reaching effect on the economic structure of society. Although known to the Hittites and rulers of Mitanni in the fifteenth century B.C., this metal did not become widespread until the ninth to seventh centuries B.C....." When speaking of the use of iron at this period, however, a reservation must be made. Although this metal came into general use, this does not mean that it finally replaced copper and bronze, for these continued to be widely employed for a long time. This transitional period during the early centuries of the first millennium is well illustrated by the Cemetery at Sialk. The tombs of the ruling class of horsemen show that weapons as well as harness, and even utensils were made of iron, although there was still a number of bronze objects."

"Nevertheless, the quantity of iron used was not yet as great as that of copper. If we consult the lists of booty amassed by the Assyrian armies, it appears that the weight of iron carried off from Iranian towns never equalled that of copper, and indeed scarcely amounted to half of the latter.... The presence of iron jewellery, in the modest tombs of Sialk is hardly a criterion of the amount of iron which was available elsewhere, for we know that Sargon II's troops (end of the eighth century B.C.) were still armed with bronze picks and axes; that the treasury of Alyattes, king of the wealthy state of Lydia, at the beginning of the 7th century B.C., possessed iron vases as well as gold and silver vessels; and that Croesus, his successor, presented worked vases of iron to the oracle at Delphi. Many iron arrow-heads and javelins were also found in the tombs of Sialk. It should, however, be recalled that the excavators of the wealthy towns of the kingdom of Urartu found that iron objects were much less common than bronze".

Despite a bias in the chronological estimation of Ghirshman, the presence of iron in Sialk and elsewhere in Iran in a date-range comparable with the chronological assessments of the Aryan settlements in India pave the way for its larger and more extensive use almost immediately after its first emergence in the region.

From the foregoing it would be clear that it would be idle to attempt to seek traces of a linear evolution from Sialk VI to the culture of the early Aryan settlers in India on the basis

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merely of pottery or other material equipments. Nevertheless, as the Aryans came to India from outside, in spite of some claims to the contrary, as will be established in the following pages, they could not but have been influenced by the cultural contacts with the Iranians, as the Zoroastrian religion is but a reformation of the *Vedic* religion, and the Old Persian language has close affinities with the *Vedic* with clearly marked differences that emerged later. That their cultural equipments would show differences is easily explained by the difficulties of transporting *en masse* such fragile objects as pottery over long distances. Of the more durable equipments of metal some must indeed have been carried and are yet to be discovered. It must at once be considered that the Aryan settlers had no end of trouble in the earlier years of their settlement. These years were scarcely suitable for establishing new industries, such as of iron, as they would hardly have had the time and leisure to seek out the raw materials of the industry, especially the iron ores.

Some similarities, suggesting contacts and mutual influences have indeed been discovered in recent years between Iran and the western parts of India, represented by the post-Harappan chalcolithic culture[153] in west-central India and northern Deccan.

Nevertheless, it would not be safe to identify, on this analogy, the chalcolithic folks of western India with the *Ṛigvedic* Aryans or Indo-Iranians. As has already been pointed out in Chapter 4, the strongest objection to this suggested equation comes from the geographical focus of the *Ṛigveda* itself, which is laid entirely in the land of the five rivers, with Sarasvatī as the river *par excellence,* as the central habitat of the concerned folks.

The problem at hand leads directly to the question of the movement of the Aryans and their settlement in India.

(v) *Question of the Original Home of the Aryans: It lay in Central Asia*

It was Sir William Jones, who, in his famous address to the Asiatic Society of Bengal in 1786, laid the foundation of comparative philology in India which is the principal means of dealing with the elusive Aryan problem. The problem precisely is to trace the original language among the medley of languages known as the Indo-European languages, its habitat, and the associated folk as an archaeological-cum-anthropological entity.

Every language to begin with belongs to a group of people living together. They may represent a race or may not[154]. But

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once originated, a language is apt to behave like a transferable commodity, and may even desert its originators. The point to seek is the centre from which this speech-form, along with the rudiments of the culture of which it was the vehicle, spread over Europe and Asia. It would, therefore, be fair to assume, even at the risk of its sounding hypothetical, that the original Indo-European speech began in a small community. In course of time, in the wake of its expansion in numbers, the community must have broken up into tribes with an urge to move on and away in search of food and pasture, if not strictly of adventure. These movements must have brought the different groups into contact with other people on the way which could have but a three-fold effect, viz., (i) racial admixture, (ii) linguistic admixture and (iii) a consequential cultural modification by fusion.

The principal means of retracing these phases of human history is through the study of the languages of the groups of people that speak till to-day, or have spoken in the past, as revealed by archaeology (epigraphical records), languages akin to the parental Indo-European, and their archaeologically discovered cultural *ensemble* in the background of their most ancient literature, namely, the *Vedic* literature, which encompasses the fauna, flora and climatic conditions described in them. This method is based on the premise that the *Vedic* literature reflects the most ancient and original culture of the Indo-European speakers. If it does not, a natural fallacy would emerge, and the *Vedas* would no more be a help in the study. Notwithstanding this fallacious premise, sincerest endeavours have been made to trace archaeologically as well as through linguistic palaeontology the most ancient speakers of the Indo-European language, their original habitat, their dispersal and courses of movements in different directions and their ultimate settlement in new territories by this method.

The Indo-European languages are broadly divided into two groups, called respectively *Centum* and *Satem*, based principally, on the distinction of 'K' or 'S' sounds, peculiar to each group. The *Centum* group includes the (i) Celtic (ii) Germanic, (iii) Italic, (iv) Greek (v) Hittite, and (vi) Tocharian families while the *Satem* group includes (i) the Albanian, (ii) Letto-Slavonic, (iii) Armenian, and (iv) Indo-Iranian language families, respectively.

No other humanistic problem has perhaps presented such manifold difficulties as the problem of the original home of the Indo-European speakers and the courses of their movement. The controversy on the original home has not died down till to-day, and

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perhaps the best commentary on the present situation is by A. B. Keith, who had said more than two decades ago, "Our ignorance is tantalizing, but it is better than the assumption of knowledge"[155]. He said further, "The true conclusion from all the evidence remains that there have not yet been any grounds which justify us in identifying the Indo-European home, and that in all likelihood the question is one which does not permit at present of an answer of scientific character".

He goes on to declare in his paper on the home of the Indo-Europeans, "It must be added that efforts to assign the Indo-Europeans to any of the many cultures now known to have existed in Asia or Europe must be regarded as at present at least wholly premature."[156]

Keith emphasizes, "If we lay aside our prejudices in favour of Europe or Asia, we must confess that there is really no adequate ground for localizing the Indo-Europeans in either, if we adopt as our criterion a comparison between the hypothetical Indo-European civilization and that revealed by archaeological research in either continent."[157]

Nevertheless, out of the clashes of arguments certain facts have emerged, and the problem is perhaps nearer its solution to-day than ever before. It will, therefore, be endeavoured to set forth the principal viewpoints in regard to the problem in hand and draw such germane conclusions as may be possible in connexion with the introduction of iron into India.

The cradle of the original home of the earliest folk who spoke the Indo-European language has been tossed about a great deal, though confined essentially to Europe and Asia[158]. At the farthest, outside this zone, have lain the Arctic region and only a little less far was the suggested Greenland home of Aryans. The home has been located by successive authors also in the Scandinavian countries, Central Europe, Hungary, South Russia, Central Asia, Siberia and even India itself. These views will be stated one by one, and the pros and cons briefly discussed, wherever necessary, in order to arrive at the most acceptable of the various mutually exclusive suggestions outlined above.

It was Bal Gangadhar Tilak[159], who pronounced on the basis of his astronomical calculations that the original home of the Aryan speakers lay in the Arctic region in the north. This view has no adherents to reckon with to-day, and cannot be proved culturally or through linguistic evidence.

Tilak believed that the Arctic home was destroyed by glaciation about 10,000-8000 B.C., and that the ancestral Aryans settled in Central Asia about 6000-5000 B.C. These conclusions are clearly

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opposed to the modern evidence on chronology which will be examined later.

Strzygovski's suggestion that Greenland was the original home of the Aryans[160] deserves no more than a passing mention.

T. J. Engelbrecht, thought that the Swedish coastal region was marked by the use of the horse and chariots after the end of the Stone Age. These provided them with a superiority in fighting and they made full use of it—and it reflected itself in the expansion of the Indo-Germanic speeches. This region was, therefore, to be considered as a claimant to being the original home of the Indo-Europeans[161].

One of the views that have dominated the minds of a large band of people is that of Penka[162], who believed in the Scandinavian countries being the original home of the Aryans. It also emphasized the superiority of the race that represented the culture of these ancestral folk, and gave rise to the mythical '*Herrenvolk*' theory of central Europe, which had put the whole world out of gear for quite a long time. The theory has been thoroughly discredited, even by an appeal to arms. But the echoes have not entirely died down, though to-day almost no one, except, K. F. Wolff,[163] lends any measure of support to the theory.

The theory of the central German cradle, comprising Jutland or central Germany, of the Aryans owes itself primarily to G. Kossina[164], and H. Hirt[165]. Their main argument is based on the close links of the Finno-Ugrain speech as well as of the Lithuanian to the primitive Indo-European tongue as to suggest a vicinity of the habitat of these languages to the original home. It is a linear successor of the idea of the Scandinavian cradle, and is now no more supportable than its Scandinavian counterpart, though it is possible that the original home lay not very far from the suggested Central European scene.

P. Giles[166] introduced the theory that Hungary was the original home of the Indo-Europeans on the principal argument that the Indo-Europeans were nomads and were not expected to stay in one place, and, in consequence, their language was simple. In reality no substantial argument has been advanced by Giles in support of his theory, and it does not stand the test of the standards applied, howsoever inadequately, to assess the original home of the Aryans.

J. de Morgan[167] expressed the view that Siberia in north-east Asia was the original home of the Aryans at a time when Europe was passing through the Ice Age, and Siberia had semi-tropical conditions. After the glacial period, the *Centum* speaking people moved westwards into Europe into the Danube region. The *Satem* speaking people moved instead towards Persia, and later to India.

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Even Morgan concedes Central Asia as the later home of the Aryans. Morgan's theory of the Siberian home is clearly subjective and does not lend itself to any objective support.

The consensus of opinion has now veered to the theory of an Asiatic home[168] of the Aryans, and the region lies anywhere between South-Russia and North-West India, with the rather vague, though differently interpreted, zone of Central Asia heading in popularity, not without an occasional neighbourly swing to Europe[169].

It was Nehring who first propounded the theory of the South-Russian home[170], and he was joined in the view by several others in succession for one or more reasons which have been stoutly and ably defended. Nehring felt that the region of the original home extended naturally also towards the west, making an inroad into Europe.

O. Schrader[171] also suggested South-Russia as the original home of the Indo-Europeans. From the steppes to the south of Russia the people wandered and then moved on to Turkestan, thence to Khokand and Badakhshan. Thereafter they split up into two groups, one coming to India through the Kabul valley, and the other to East Persia.

H. Peake and H. J. Fleure[172] have placed the original home of the Aryans not only in South-Russia but also in the steppes lying further to the east.

This distinguished team is joined by Grierson[173], Gordon Childe[174], B. K. Ghosh[175], Richard Hauschild[176], and Brandenstein[177] among others. The argument in favour of this view, which appear by far the most plausible, will be examined at some length in their proper place. Meanwhile the other remaining views should claim the attention first.

E. Forrer held the view that the Proto-Indians dwelt for long in Eastern Armenia on the Caspian Sea, preparatory to their movements to the south-east and the east, having come over the Caucasus[177a].

Paul Kretschmer was of the opinion that the ancestors of the Aryans dwelt in the Mitanni area or Mesopotamia, before they advanced over the Zagros mountains into India through Gedrosia[177b].

Two other principal views in regard to the Central Asian home of the Aryans are by E. Meyer and E. Herzfeld, respectively. E. Meyer felt that the ancestral home lay in the Pamirs[177c], while Herzfeld traced, '*Eranvej*' or '*Āryāṇāṁ Kshatraṁ*' to the valleys of the Oxus and Jaxartes, or the Amu Darya and Syr Daria, respectively, draining into the Aral Sea[178].

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Heine-Geldern stated, "The main bulk of the Indo-Aryans had resided since the first half of the second millennium B.C. in Kurdistan, Armenia, North-West Persia or Transcaucasia."[179]

Jarl Charpentier said "that the home of the Indo-Europeans was in Asia and in that part of the vast continent, where were found wide grasslands on which to roam about with their herds of cattle and horses, where the climate was temperate or, at times, a cold one, and where were found the animals usual in such a zone and among the trees the birch, the willow and the fir tree. No part of Asia answers quite to this description except the regions to the east of the Caspian Sea, which are generally called Central Asia, with the neighbouring plains of Turkestan, where, formerly, conditions of living were far easier. It is in these parts and perhaps also in a region a little to the north of them—that according to my opinion roamed the nomadic tribes speaking Indo-European with their horses, cattle and wagons."[180]

E. Horrowitz stated that the forefathers of the Hindus and Parsis lived in Balkh and Babel[181].

A. H. Sayce held that Asia Minor and Mesopotamia were the original home of the Indo-Aryans[182].

Aurel Stein opined that the migration of the Aryans took place from the direction of Anatolia[183].

In this context the views of Leonard Wooley regarding the original home of the Hittites, who belonged to the *Centum* branch of the Aryan family, as having lain in the southern Caucasus region, as evidenced by the occurrence of Khirbet Kerak pottery, point to the trend from a region to the north of Mesopotamia[184]. It is an interesting theory, regardless of its merits, as it indicates a more northerly habitat with reference to Anatolia or Mesopotamia and points in the direction of South Russia.

Yet another scholar, F. E. Pargiter, believed strongly in an original home in the middle Himalayan region to the north and outside India[185], whence the Aryans came into India, and settled, before groups of them moved out to Iran or the Mitanni kingdom. His theory almost borders on an Indian home for the most ancient Aryans. Of this latter view there are many protagonists. They believe with Pargiter in invasions from India into Iran as well into Mesopotamia during the Mitanni period, and explain the evidence of Indo-European vestiges in the region in the light of an Indian home in origin for the Aryans.

T. Burrow[186] is of the view that it is not possible to arrive by comparison at any unitary language which may have been the parent of the Indo-European languages. Its original habitat can at best be expressed in terms of widely separated boundaries, but not pin-pointed in the form of a restricted country.

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It did not, however, extend to the east beyond the home of Finno-Ugrian, which has links with the Tocharian[187] of Asia, bounded by the river Volga and the Ural mountains. The possible area of the original home lay, therefore, in the central portion of Europe extending from the Rhine to the central and southern parts of Russia. The different linguistic groups of the Indo-European family split in the original home itself and spread to different parts of the world not in their pristine form, but in developed and separated forms.

It is also to be noted that the old Indo-Iranian language as revealed in the *Avestan* text and the inscriptions of the Achaemenid rulers is remarkably near to the languages of the *Ṛigveda* and the two groups cannot, therefore, really be separated by a wide margin of time. Against this background it must be remembered that the earliest traces of the Aryan language in the Mitanni kingdom, which suggest a prior contact with the Iranians and Indo-Aryans, are dated to about 1500 B.C. The Persians and Medes are referred to in the Assyrian inscriptions of the 10th century B.C., by which time they had been well settled. Thus the date of the Indo-Aryan immigration would come according to Burrow, to about 1700-1400 B.C., and the period of the composition of the *Ṛigveda* to *circa* 1200-1100 B.C, with an adequate margin backwards or forwards.

The separation of the Indo-Aryans and the Indo-Iranians would, on this showing, have taken place slightly earlier. "The special relations of the Indo-Iranian with the *Satem* group of languages and with Balto-slavonic, in particular, together with evidence of contact between it and Finno-Ugrian in the primitive Indo-Iranian period, point to its original location in South-Russia. The presence of the Aryans in the Near East in the middle of the second millennium B.C. can best be explained by an invasion from this quarter. The major migrations, however, took place to the East, from a region north of the Caspian Sea, and resulted in the major portion of the Aryan tribes being concentrated in what is now Russian Turkestan. From there Iranians and Indo-Aryans *separately* penetrated into Iran and India. It is only at this period that a common Indo-Iranian, albeit with dialected divisions, divides into two branches, Indian and Iranian."

The late B. K. Ghosh considered the existing views on the original home of the Aryans comprehensively[188] and established that the cradle lay in a region equidistant from Hittite Asia Minor and North-West India, i.e., in Central Asia, and as the Hittites appear in the west about 1950 B.C. the beginnings of the *Vedic* culture can be traced back to at least 2000 B.C. The presence of Indo-Europeans in two such widely separated regions would

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lead to the conclusion that their original common home was somewhat equidistant between the two regions. This region should have lain in the south of Russia, as earlier suggested by Nehring, Schrader and others. The prime consideration in this assessment is, of course, the reasonableness of the argument that the region should be approximately equidistant from Turkey and North-West India to account for such divergent dispersals. The movement should have begun about 2500 B.C., as the first incursion of the Hittites are known to have taken place about 2400 B.C., when they settled in Cappadocia, but definitely before 1950 B.C., the date of the emergence of the Hittites in Asia Minor. The westward move of the Mitannis, who represented the undifferentiated (*Vedic*) Aryan way of life, must also have started long before 1450 B.C., the initial date of Śauśatar. This would point to an earlier date in consonance with the prime splitting up of the Indo-Europeans.

The second consideration is the preponderance of Indo-European elements in the Finno-Ugrian language. It would imply vicinity for the parental Indo-European home. The third consideration is, of course, the archaic character of the Lithuanian, which, in spite of its earliest literature being dated to the 14th century A.D., is considered to be the nearest to the original Indo-European tongue. The original home could not, therefore, be far from the present-day habitat of the Lithuanians either. Such a region is the steppe land to the south of Russia. This is corroborated also by the occurrence of Indo-European elements in the Semitic language. This implies that the Semites were in contact with the early Indo-Europeans. Therefore, the original habitat of the Indo-Europeans should have been somewhere in the neighbourhood of the Semites as well. All these would point to the region indicated above, within easy reach of the Lithuanians, Finno-Ugrians, Hittites and Semites alike.

The discovery of Tocharian, a *Centum* dialect of the Indo-European, in Eastern Turkestan is yet another contributory argument in favour of the theory of a South Russian home.

Ghosh has also met the arguments of the protagonists of the theory of an Indian home of the Aryans. The galaxy of scholars holding this view includes Ganganath Jha, D. S. Triveda, L. D. Kalla and A. C. Das among others. The main argument in favour of this theory is the lack of any refereice to an earlier home outside India in the *Ṛigvedic* literature, and that the geographical background of the *Ṛigveda* is laid in north-west India. The former standpoint is probably not entirely true as the river name Sarasvatī, which was the river *'par excellence'* in *Vedic* India, appears to be a phonetic variation of the name *Harahvati,*

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known in Iran, as well as the mention of the *Dāsas* and *Dasyus*, as standing for *Daha* and *Dahae*, also known from Iran. The mention in the *Ṛigveda* of *Hariūpīyā* is possibly an equivalent for *Hariob*, in Afghanistan, and *Yavyāvatī* stands for the Zhob of to-day (see pp. 140-41).

Secondly, parts of the *Ṛigveda* appear to have been composed considerably after the settlement of the Aryans in India, and by that time they had been almost so fully naturalized as to rule out memories of the earlier home.

The same protagonists seek to explain the presence of the Aryan elements in Mesopotamia among the Mitannis as the result of a later colonization by the Aryans from India. This is unlikely as, in that case, it cannot be explained why the Aryans had not Aryanized the whole of India, nearer home, to begin with.

This is also sought to be proved by the considerations of the chronology of the emergence of the Aryan culture in India, outlined below.

The two next important points to determine in respect of the movement of the Aryans towards India are, (i) the date of their emergence in India, and (ii) the route they took.

Though there is no agreement among scholars about the route, the evidence of the intimate connexion between the Indo-Aryans and Indo-Iranians is amply clear. This is construed by the parallelism in the languages of the Old Persian and the *Ṛigveda* as well as by the parallelism in the religions of the two countries in spite of the schismatic nature of the Iranian or Zoroastrian religion. These factors by themselves imply close affinities resulting from living together for a considerably long time in Iran or outside. The bifurcation appears, on the whole, to have taken place in Iran itself. This is indicated by the allegedly obvious preference of the *Ṛigvedic* Aryans for Iranian names with which they were familiar as stated above (see also pp. 140-41). In this context it may also be stated that the controversial aspect of the date of Zoroaster has not disappeared, but from a consideration of different accounts, he cannot be placed earlier than 630 B.C.[189] Archaeology has shown that the most virile extraneous culture that emerged on the Iranian soil before Zoroaster was the culture of Sialk VI B, which has, therefore, to be associated with the Aryans. The bifurcation came obviously between *circa* 1200 and 630 B.C.

The fact that the sound 'S' which changes into 'H' in Old Persian remains unchanged as late as 775 B.C.[190] shows that the bifurcation could not have taken place very much earlier than this date. On linguistic grounds Ghosh, however, dates both the *Zendavesta* and the *Ṛigveda* to *circa* 1000 B.C.[191]

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(vii) *Date of the Aryan Immigration into India and of the Composition of the Ṛigveda*

The earliest date so far suggested for the *Ṛigvedic* culture is 25,000 B.C. Tilak considered the date to be 10,000-8000 B.C.[192]. Jacobi also believed in the near-accuracy of Tilak's date-scheme and suggested 4500-2500 B.C.[193] D. N. Mukhopadhyaya has felt that the period 2500-750 B.C.[194] should be considered proper for the revolutionary doctrines of the Buddha and Mahavira to emerge in reform of the *Vedic* concepts of religion. Pargiter considered the Aryan immigration to have taken place about 2000 B.C.

The sheet-anchor of the chronology is, of course, provided by the date of the Boghaz Keui document of the treaty between the Hittites and Mitannis, i.e., 1365 B.C., and generally of the date of the commencement of Mitanni rule in West Asia. It has been endeavoured to indicate that the *Ṛigvedic* way of life began about 2000 B.C., on the basis of the firm date of the Hittite incursion into Asia Minor. As most scholars[195] are agreed that the Indo-European words of the Boghaz Keui treaty and other Mitanni documents are characteristic of a period when the Indo-Aryans and Indo-Iranians had remained undifferentiated, a date earlier than 1450 B.C., and as near to 2000 B.C., as possible, as the probable date of the beginnings of their cultural life is probably acceptable[196].

It has also been sought to establish that the claims made for the Harappa civilization to be Aryan are not tenable. The Aryan immigration is clearly a post-Harappan affair. Walter Fairservis (Jr.)[197] has suggested *circa* 1200 B.C., as the probable terminal date of Harappa. Heine-Geldern[198] has also suggested the date of 1200-1000 B.C. for the Aryan immigration into India. The fact of the tumult and upheaval caused by the Thraco-Phrygian invasion of Asia Minor which took place about 1200 B.C. reflecting itself in widespread folk movements in all directions has been mentioned earlier. Its effect on the Aryan immigration into India can on this ground be suggested.

The date of the Boghaz Keui document would also lend credence and support to the date of the post-Harappan Aryan immigration into India. Against this background, it is not surprising that Ghosh has suggested 1000 B.C. for the composition of the *Ṛigveda* as well as for the Old Persian language. One of the objections to such a low dating has been the rather short time-lag for the schisms or revolts introduced by Buddhism and Jainism to arise against the established order. A period of 400 years should indeed by fairly long for the reformatory religious revolutions introduced by the Buddha or Jina in India and by Zoroaster in Iran. It may also be borne in mind that the *Vedic* way of life

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had a far longer duration than indicated by the suggested date-scheme. This cannot really be a serious consideration, as the revolts were not actually against the religious thoughts, but against the rituals and attendant practices, in all the cases.

That the Iranians and *Ṛigvedic* Aryans once lived together can be stated to be beyond dispute. The Iranian pantheon as contained in the *Zendavesta* has the following names, which have their *Vedic* counterparts akin in sound, viz., *Ahura—Varuṇa, Mithra—Mitra, Verethghna—Vṛitrahan, Naonhaitya—Nāsatya, Yema—Yama, Haoma—Soma.*

Among geographical names occurring in the Old Persian inscriptions, the form *Harahuvatish* compares with *Sarasvatī* with the interchange of 'S' and 'H' sounds, and *Haraiva* compares with *Sarayū*[199]. While in the Achaemenian empire these names have been identified with the provinces, Arachosia and Aria (modern Herat), respectively, in the *Ṛigveda* they appear to have been transferred to names of rivers[200]. The Iranian river name *Rañhā* has its *Ṛigvedic* equivalent in *Rasā*[201]. The names *Pārthava* occurring in the *Ṛigveda*[202], *Parśu*[203], *Paraśavya*[204], *Pṛithuparśavaḥ*[205] and *Balhika*[206] occurring in the *Atharvaveda,* which have indeed parallels in the form of *Pārthava, Parśa* and *Bakhtrish,* respectively, in the Old Persian inscriptions, have been taken by some scholars to stand for Parthians, Persians and Bactrians (of Balkh), respectively. Regardless of the correctness of the suggested identification, these suggest a close connexion between the Iranians and Indians, and, as Macdonell and Keith would put it, "At most the only conclusion to be drawn is that the Indians and Iranians were early connected as was actually the case. Actual historical contact cannot be asserted with any degree of probability[207]

The name *Rasā*[208], apparently a river in the extreme north-west of the *Vedic* territory, which has its Iranian parallel in *Rañhā* mentioned by the *Vendidad,* is often sought to be equated with Araxes or Jaxartes. Even taking the sense of 'sap' or 'flavours of the waters', it would stand for a river and form a significant instance of Indo-Iranian contacts.

While the form of Indian province is *Hapta Hindu* in the *Avesta, Ṛigveda* has the form *Sapta Sindhava*[209]. Yasht[210] mentions *Us-Hindava,* a mountain identified with the Hindukush, *Varukasha,* a mythical sea, *Uparisaena,* identified with *Paropanisus, Bakhdhi* equated with *Bactria, Haraiva* with Herat, *Vaékereta* with Kabul, *Gandhāra* with Rawalpindi and Peshawar Districts, *Harahvaiti* with *Arachosia, Haetumant* with *Helmand.*

Linguistically, the contact between the old Iranian and the *Ṛigvedic* languages was quite close. Winternitz was of the view,

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"The dialect on which the Ancient High Indian is based, the dialect as it was spoken by the Aryan immigrants in the North-West of India, was closely related to the Ancient Persian and *Avestic* and not very far removed from the primitive Indo-Iranian language. Indeed the difference between the language of the *Vedas* and this primitive Indo-Iranian languages seems to be less, perhaps than that between the Indian languages Sanskrit and Pali."[211]

B. K. Ghosh stated, "The ancient Aryan culture of Iran was thus hardly distinguishable from the ancient Aryan culture of India. And that is as it should be, for both were derived from one and the same Indo-Iranian culture."[212]

All this would plead for a bifurcation in Iran itself. This is indicated further by the considerations of the route by which the Aryans may have come into India.

(viii) *Route of Aryan Immigration into India*

It was Gordon who stated emphatically that the Aryans, regardless of the identification of their orginal home, lived in Iran before their final emergence on Indian soil. To quote his words, "..... It is postulated that as far as India and its borderlands are concerned the Indo-Aryans came from Iran, no matter where their previous habitat may have been, and that they came partly from the north via Herat and from Kirman via Qila-i-Bist converging on Kandahar, partly, as shown by the remains at Shahitump, via Persian and Baluch Makran. To avoid the series of mountain ranges that spread fanwise from the region of Kabul, the likely lines of approach would have been the Tochi, Gomal and Kurram Valleys, of which last two are mentioned in the *Ṛigveda*."[213]

Walther Wuest,[214] writing on the age of the *Ṛigveda* has considered the question of the route of the Indo-Aryans at some length and has found himself in agreement with the several possible routes as stated below. One possible route lies over the Zagros through south Iran and Gedrosia to the lower Indus, as suggested by P. Kretschmer. He points out that Semiramis, Cyrus and Alexander also used this route in later times. He has cited W. Geiger[215], who had pointed out the great importance of the Zagros route in that it afforded access to the tableland of Iran. Geiger has also shown the difficulties of the route along the edge of the border hills of South Persia.

Yet another possible route was through the middle part of Iran —around Dasht-i-Lut in the south of Kevir in the north—over Kirman and thence to Sistan.

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E. Herzfeld[216] favours a route—over Baghdad, Kermanshah, Hamadan (Ecbatana), Tehran (Ragai), Khorasan (Herat), Kandahar and Kabul to Panjab or to the Quetta region over a southern pass.

Yet another variant of the route was Baghdad—Susa-Fars, Kerman, Dasht-i-Lut, Helmand with a possible bifurcation either to the Panjab or to Baluchistan.

A possible route through Bampur in Gedrosia may have led as well to the Las Bela region.

A route to Kabul—Ghazni and Kandahar—would bifurcate towards the Panjab as well as towards the south-east in the direction of the Bolan Pass.

Wuest[217], in agreement with Hillebrandt, favours the theory of an entry into India through the Bolan Pass and seeks to buttress the suggestion by reference to the tribe *Bhalānasa* in *Ṛigveda*, VIII, 18, 7, against whom the Aryans won an early conflict, on the grounds of the phonetic similarity of the names.

Grierson[218] thought that the Indo-Aryans came first into Afghanistan and entered India through the Kabul valley in several waves.

Brunhofer[219] endeavoured to show that the scene of the *Ṛigveda* was Iran and Afghanistan, a point further indicated by the transference of names of rivers and people. G. Huesing[220] is in agreement with Brunhofer, and emphasizes the point with a reference to the names in qustion, namely, *Pārthava, Parśu, Sarasvatī,* and *Rasā.*

P. Kretschmer's view that the Indo-Aryans passed over the Zagros through Gedrosia into India, has been referred to above. The intercession of Gedrosia on the route is influenced by the parallelism of *Pura* (= city) with Bampur occurring in Gedrosia, as indicated by Arrian[221].

Charpentier thought that "The Indo-European movement did perhaps start with the Indo-Iranians moving towards the south and crossing the Jaxartes, thus entering the fertile province of Sogdiana. From Sogdiana their way lay across the Oxus into Bactria, where they may perhaps have dwelt for some considerable time, ere one branch of them struck towards the southwest, directing itself against Media and Mesopotamia, while other hordes took to the south-easterly way and invaded India through the pathways of the extreme north."[222]

Heine-Geldern, expressing himself on the course of Aryan immigration into India, states, "the *Vedic* Aryans reached India by way of Northern Iran and Turan, where they came in touch with the Parthians and fought Dahas and Parnians."[223]

Sir Aurel Stein[224] considered the question at some length and

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indicated three possible routes of the Aryan immigration into India through the Indo-Iranian borderlands, which run over a length of some 1200 miles (1931 km.) from the north-west to the south-west. This area could be divided into three zones, namely, (a) the northern, containing the Khyber Pass and the Kabul valley, (b) the central, covering the Bolan, Khojak, Kurram, Tochi and Gomal passes, and (c) the southern, flanked by the mountain regions of the Kalat, running north-south, parallel to the Indus, but containing the open Makran coast. While the high mountainous walls in the northern zone would hardly encourage any flourishing settlement or civilization, allowing, however, passage through the gaps to the moving hands, the central zone was according to Sir Aurel Stein far more suitable for vast ethnic movement.

Stein, who traced the Aryans to Anatolia, was categorical that from this direction only two routes were possible. One of these lay over Azerbaijan—Elburz to the wide plains of central Asia between the Oxus and the mountains bordering Khorasan and ultimately to the north of the central deserts of Iran. The other route, to the south, over broad plains of Kurdistan, Luristan, the Bakhtiari country, Arabistan, valleys of Fars and Kerman and thence to Gedrosia, Sistan, Arachosia, Kandahar and Ghazni. Stein believed that the Aryans came by this route and entered India through the central zone, mentioned above. He sought even to seek a corroboration of this central route of entry by the sequence in which the rivers are described in the Nadī Stuti[225] of the *Ṛigveda,* wherein the list begins with the Ganga and travels towards the north-west. This last interpretation cannot be accepted as correct, as the sequence of the rivers is obviously the outcome of the settlement in the land, and follows the direction in which the composer views the land and rivers. This cannot really be held as reflexive of the course of movement of the Aryans into India.

Regardless of the route chosen by the Aryans, on which the last word remains yet to be said, it is inescapable that the Aryans passed through Iran in the course of their movement towards India. To quote Stein, "There could never be any doubt for serious students that these tribes, who called themselves Aryans in distinction from the original inhabitants of the land whom they fought and subdued, reached the Indus and the land of five rivers beyond it from the west and across the Indo-Iranian border region. We have the clearest evidence of this in the fact that in the territories immediately adjoining this region westwards we find established from the earliest times a population speaking languages derived from the eastern Iranian

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tongue, which in its oldest form preserved by the *Avesta*, the sacred Zoroastrian texts, is so closely akin to *Vedic* Sanskrit as to appear almost like a dialect.'[226]

(viii) *Aryans were acquainted with the Use of Iron before their Immigration into India*

In view of the Aryans and Iranians living together for a considerably long time, and the passage of the latter through Iran on their way to India, it was impossible for the Aryans to be blind to the use of iron objects in peace and war, contemporaneously in vogue in Iran. The advantages of this metal was too obvious even at this stage of its technological development to be ignored. It is also likely that they employed this metal themselves. If so, it should not be difficult to concede that the Aryans would take time to settle down in their new home in India, having overcome their initial difficulties, before they could set out to look for the ores to set up their own industries as much to meet their needs of daily life as to furnish themselves with the sinews of war, success in which was the principal means of self-preservation and expansion.

NOTES AND REFFERENCES

1. *I.A.*, 1958-59, p. 48.
2. Lal, *op. cit.*, p. 147.
3. Thapar, in a paper on the subject at the first International Conference on Asian Archaeology entitled "The West Asian Background to the Protohistoric Pottery of India in the second and first millennia B.C."
4. S. C. Ray, at the above-mentioned Conference on Asian Archaeology in a paper on "The Indo-Aryans and their Earthly Culture".
5. A. Stein, *An Archaeological Tour in Gedrosia, M.A.S.I.*, no. 43, pp. 98-103; Stuart Piggott, *op. cit.*, pp. 216-218. For the description of the Painted Grey Ware, see Lal, The Painted Grey Ware of the uppper Gangetic Basin, *J. Roy. A.S.B.*, Letters; Vol. XVI, No. 1, 1950, pp. 89-102; *A.I.*, nos. 10 & 11, pp. 32ff. and the Appendix at the end of this treatise. The painted grey ware pottery found in the burials at Shahi-tump is a distinctive ceramic and is represented in the usual shapes of shallow bowls with a foot-ring, deep bowls of large size and beakers of globular or conical profile and bowls enlarging themselves into dishes. The painting is executed in a colour "which varies from black to a reddish brown, and has sometimes a tendency to run".

The designs are worked both on the exterior and interior; while the arrangement on the exterior is in zones or panels, the decorative effect is achieved with a *svastika* or allied motif in the centre of the inside of bowls. The other motifs employed include angular spirals, chevrons, sigmas, lozenges, triangles and wavy double lines enclosing dots.

According to Piggott the nearest parallel to this pottery is to be found in the Khurab Cemetery near Bampur in Eastern Iran, about 150 miles (about

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202 km.) away from Shahi-tump. He is of opinion that this ware is to be traced to the Buff-ware group represented in Susa I and other sites in Fars, representing the final expression of a tradition that lasted in southern Persia from the 5th millennium B.C. to the beginning of the second. Sir Aurel Stein had already recognized parallels nearer home in Sistan.

The Painted Grey Ware of India is similarly a thin smooth grey ware, with variants becoming reddish-brown (or brownish red), having a soapy feel. The shapes represented comprise bowls, sometimes with a flattish foot, and dishes. circles, groups of circles and spirals. The *svastika* design occurs both on the interior in linear or dotted patterns, usually in black colour.

The designs on the exterior consist of various combinations of plain bands, groups of dots, dots and dashes, wavy lines, concentric semicircles, sigmas, concentric circles with radiating rows of lines and criss-cross-hatched lozenges or diamonds.

The inner base of the vessels, especially dishes, carry scalloped concentric circles, groups of circles and spirals. The *svastika* design occurs both on the exterior as well as interior. Apart from the similarity of the basic utilitarian pot types, namely, the bowl and dish, some of the designs like the *svastika*, sigma or circles, wavy double lines enclosing dots, and several other simple arrangements are common. It is also to be noted that the designs are usually in black in both cases, and the patterns share in common the lack of crisp vigour. While the Painted Grey Ware of the Ganga plains is associated with a brownish-red ware, also similarly painted, the ceramic ware from Shahi-tump varies from grey to pinkish and yellowish-buff besides the brownish-red. It is interesting to note that the only ceramic ware approaching the Painted Grey Ware in ancient Turkey (Asia Minor) is a polished grey ware found in Troy VI (see Seton Lloyd, *Early Anatolia*, pp. 151-152; Schaeffer, *Stratigraphie Comparée* etc., pp. 253-254 and foot note 1 on p. 254).

Mon. Blegen, writing in the *American Journal of Archaeology*, 1934, p. 17 and note 1, states that the other distinguished grey ceramic, known as the Minyan ware, which Professor Miloeciz of Heidelberg is stated to have admitted as comparable to the Painted Grey Ware of India during his recent visit to this country, probably reached the Greek mainland and Troy more or less synchronously from a common source.

It may have been introduced by the Hittites, to be replaced soon in Asia Minor, first by the Cappadocian Ware and then by the Hittite Ware. The fact that it has not been observed elsewhere in Asia Minor may be set down as much to accident as to a dominating influence of native pottery. Though other island-like appearances of the Grey Ware have been noted in widely separated regions and a developed stage of the Ware is met with in India, without traces of its antecedent stages, an extraneous source in the west is quite possible in view of Piggott's emphasis on the links with Khurab and Susa etc., though an under-current of Aryan influence throughout, linking them all, is neither necessary to presume nor is it likely to be found. It may also be noted that the design of *svastika* painted on the pottery is peculiar to Shahi-tump and does not occur elsewhere in the region.

6. The subject of the antiquity of iron has been dealt with variously in the following works. The list is not exhaustive but fairly representative.

(i) G. A. Wainwright, in "The coming of Iron", *Antiquity*, Vol. X, 1936, pp. 5-24.

(ii) R. J. Forbes, in Extracting, Smelting and Alloying, *History of Technology*, Vol. I, Oxford, 1954, pp. 592-599.

(iii) R. J. Forbes, *Metallurgy in Antiquity*, 1950, pp. 379ff.

(iv) H. H. Coghlan, *Notes on Prehistoric and Early Iron in the Old World*, Pitt Rivers Museum, University of Oxford, 1956.

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(v) J. Przeworski, *Metallindustrie Anatoliens in der Zeit von 1500-700 vor Christus, Internationales Archiv fuer Ethnographie,* Leyden, 1939, Band XXXVI, Supplement.

(vi) O. Johannsen, *Geschichte des Eisens,* Duesseldorf, 1953.

(vii) Leslie Aitchison, *History of Metals,* London, 1960, 2 vols.

(viii) O. Montelius, Wann begann die allgemeine Verwendung des Eisens, *Prachistorische Zeitschrift,* 1913, pp. 299.

(ix) William Gowland, The Metals in Antiquity, *J.R.A.I.,* Vol. XLII, pp. 277ff.

7. It has been made clear in Chapter 1 that the Iron Age did not begin until it actually replaced copper and bronze as the principal metal in the use of man and this happened long after man had learnt to smelt iron ores.

8. Coghlan, *op. cit.,* pp. 46-47.

9. Gowland, *op. cit.,* pp. 277ff.

10. It may be noted in this connexion that paddy husk has been playing a bigger rôle than charcoal in small-scale metal working till today in south India. Paddy husk retains the glow and heat longer than charcoal.

11. H. C. Richardson, Iron: Prehistoric and Ancient, *Amer. Journ. of Arch.* Vol. XXXVIII, no. 4, 1934, p. 39.

12. Professor R. J. Forbes of Amsterdam informs the author that "iron is not liquid below 1350°C. This is its big difference with copper. Iron ores are readily reducible at low temperatures (700-800°C.) but the resulting iron is obtained in small solid grains. In case of copper, reduction proceeds only at higher temperature, but the result is liquid copper".

13. Coghlan, *op. cit.,* p. 87.

14. M. E. L. Mallowan, Excavations at Tell Chagar Bazar, *Iraq,* 1936, Vol. III, pp. 26-27.

15. Mallowan, *Ibid.,* Vol. IV, 1937, p. 98.

16. H. Frankfort, 'Early iron in Iraq', *Man,* London, 1950, no. 160.

17. R. F. S. Starr, *Nuzi: Report on the Excavations at Yorgan Tepe near Kirkuk, Iraq,* Vol. II, Cambridge, Massachusetts, 1937, p. 125.

18. André Parrot, Kudurru archaique provenant de Senkereh, *Archiv. fuer Orientforschung, Berlin,* 1937-9, XII, pp. 319-24.

19. R. J. Forbes, *Metallurgy in Antiquity,* Leyden, 1950, p. 446.

20. O. Johannsen, *op. cit.,* Duesseldorf, 1953, p. 40.

21. Coghlan, *op. cit.,* p. 63.

22. C.F.A. Schaeffer, *Ugaritica,* I, Mission de Ras Shamra III, Paris, 1939, pp. 108ff. and W. Lamb, Review of Schaeffer's *Ugaritica,* I, *Antiquaries Journal,* XX, London, 1940, p. 392.

23. *Ibid.,* pp. 110-111.

24. *Ibid.,* pp. 116-117.

25. *Ibid.,* p. 116; note (4); J. A. Knudtzon, *Die El-Amarna Tafeln,* I, pp. 159-169. Tell-el Amarna is in upper Egypt, about 300 kilometres from Cairo. The language of the Mitanni inscription in question is Hurrite.

26. Schaeffer, *op. cit.,* p. 117; A. W. Persson, Eisen und Eisenbereitung in aeltester Zeit, *Bulletin Societé Royale des Lettres de Lund,* VI, 1933-34, p. 119; F. Thureau Dangin, *Syria,* X, 1929, p. 204; F. Cumont, *Etudes Syriennes,* p. 199.

27. Schaeffer, *op. cit.,* p. 166; R. T. O. Callaghan in *Analecta Orientalia,* 1948, Vol. 26, p. 68, writes: "Furthermore . . . . the earliest examples of weapons forged in iron may be attributed to the Mitannis".

28. E. O. Forrer, Kilikien zur Zeit des Hatti Reiches, *Klio,* XXX, 1937, p. 181.

29. E. Cavaignac, *Le probleme Hittite,* p. 73.

30. E. Laroche, *Revue Hittite et Asianique,* Vol. XV, 1960.

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31. Schaeffer, *op. cit.*, pp. 124-125; A. Goetze, *Hethiter, Churriter und Assyrer*, p. 100.

32. C. H. Virolleaud, Decouverte à Byblos d'un hypogée de la douzieme dynastie egyptienne, *Syria*, Paris, 1922, III, pp. 286ff.

33. C. H. Virolleaud, Les Tablettes cuneiformes des Mishrife-Qatna, *Syria*, Paris, 1930, XI, pp. 334, 337 & 339; D. G. Conteneau, *La civilisation des Hittites et des Mitanniens*, 1937, Paris, p. 85.

34. Schaeffer, *Les fouilles de Minet-el-Beida et de Ras Shamra*, Campagne du Printemps, 1929, p. 292.

35. Schaeffer, *Stratigraphie Comparée* etc., pp. 114-115.

36. O. Johannsen, *op. cit.*, p. 40.

37. R. J. Forbes, *op. cit.*, Leyden, 1950, p. 450.

38. B. Hrozny, *Archiv Orientalni*, I, 1929, p. 281; II, pp. 14, 75.

39. O. R. Gurney, *The Hittites*, A Pelican Book, pp. 20, 83.

40. S. Przeworski, *Metallindustrie Anatoliens*, Appendix 'D'; *Keilschrifttexte aus Boghaz Koey*, IV, no. 1; M. Witzel, Hethitische Kelischrifturkunden, *Keilschriftliche Studien*, pp. 4, 81.

41. Howard Carter, *The Tomb of Tutankhamen*, II, pls. LXXXVII B, LXXX A; III, pl. XXVII.

42. Przeworski, *op. cit.*, Appendix 'E'. He refers to the letter as one written by a king of Kizzuwatna to Hattusilis III (1283-1260 B.C.). It is published in *Keilschrifttexte aus Boghaz Koey*, I, no. 14.

43 Luckenbill, *American Journal of Semitic Languages*, XXXVII, p. 206.

44. E. Cavaignac, *Revue Hittite et Asianique*, II, 1934, pp. 233 ff; A. Goetze, *Kizzuwatna and the Problem of Hittite Geography*, 1940, Chapter III.

45. Schaeffer, *Stratigraphie Comparée* etc., pp. 297, 546.

46. A. R. Hutchieson, Iron and Steel through the Ages, *The Museums Journal*, Vol. 50, July 1950, p. 83. Hutchieson is of the view that the purposeful smelting of iron ore probably originated in the forest uplands between the Taurus mountains and Ararat, the land of the ancient Hittites. The date suggested for this metallurgical achievement is around 1400 B.C.

47. Przeworski, *op. cit.*, pp. 161 ff. He is on the contrary of the view that the development of the iron industry is the result of the long and combined efforts of all Near Eastern countries, though the folks from Asia Minor have taken a large share in this endeavour. To quote his words: "*Eine Monogensese der Eisenindustrie ist deshalb abzulehnen. Ihre Herausbilding ist der langwierigen gemeinsamen Versuche der gesamten Vorder-asiatische Welt*" etc.

48. E. Laroche, *Etudes de Vocabulaire*, VI, *Revue Hittite et Asianique*, Vol. XV.

49. E. F. Schmidt, in Anatolia through the Ages, *Oriental Institute of Chicago*, Communications, 1927-29, pp. 116-119, says that the Iron Age in Asia Minor began during the period of the second Hittite empire (1440-1200 B.C.) as indicated by arrow-heads (illustrated in fig. 164 of the text referred to), spear-points and blades (fig. 164), all of which played a decisive rôle in the victories of the Hittites.

50. Schaeffer, *Stratigraphie Comparée etc.*, p. 297.

51. Forbes, Extracting, Smelting and Alloying, *History of Technology*, Vol. I, Oxford, 1956, p. 593.

52. R. A. S. Macalister, *Excavations at Gezer*, London, 1912 I, p. 301; II, pp. 269 ff., fig. 417; III, pl. 63, p. 61

53. G. Schumacher, *Tell-el-Muetsellim, Band 2, Die Funde*, Leipzig, 1929, fig. 98.

54. G. E. Wright, Iron, the date of its introduction into Palestine, *Amer. Journ. of Arch.*, 1939, XLIII, p. 459.

55. Johannsen, *op. cit.*, p. 40.

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56. Coghlan, Prehistoric Iron prior to the dispersion of the Hittite empire, *Man*, no. 59, Jul.-Aug. 1941, p. 76.

57. Olga S. Tuffnel, *Lachish* III, *The Iron Age*, Oxford, 1953.

58. Przeworski, *Die Metallindustrie Anatoliens in der Zeit von 1500 bis 700 vor Christus*, Leyden, 1939, p. 143.

59. V. G. Childe, *The Dawn of European Civilisation*, 3rd edition, London, 1939, p. 28.

60. Goghlan, *op. cit.*, p. 64.

61. Forsdyke, *Annual of the British School at Athens*, XXVIII, pp. 279, 296 and pl. XXIII.

62. Schaeffer, *op. cit.*

63. Ayrton and Loat, *Pre-dynastic Cemetery of El Mahsana*, p. 144, fig. 95.

64. Information from Shri B. B. Lal, who recently led an expedition in Nubia; also from newspaper reports.

65. Randall MacIver and Wooley, Buhen I.

66. G. Conteneau, *op. cit.*, p. 112.

67. *Ibid.;* O. Johannsen, *op. cit.*, p. 38; see also *Journal of Egyptian Archaeology*, XXVIII, p. 57, for the evidence of IVth dynasty iron in Egypt.

68. Johannsen, *op. cit.*, p. 38; see also *Antiquity*, Vol. X, pp. 355-7, for the evidence on VIth dynasty iron in Egypt.

69. *Ibid.*

70. *Ibid.*

71. *Ibid.;* See also O. Montelius, *op. cit.*, p. 299.

72. Montelius quotes Hall from *Man*, 1903, p. 149, wherein he expresses the view that in all probability iron became known in Egypt more or less generally before the 19th dynasty though it did not in any way replace bronze at this stage.

73. A. W. Persson, *The Royal Tombs at Dendra*, p. 56.

74. R. Ghirshman, *Iran*, A Pelican Book, 1954, pp. 60-106.

75. *Ibid.*, p. 63.

76. *Ibid.*, p. 71.

77. R. Ghirshman, *Fouilles de Sialk*, Vol. II, pp. 9, 49, 51, pls. V, XXVI, XXXIX, LVII, LIX, LXXXV; *Iran*, pp. 79-80, figs. 29-31.

78. *Ibid.*, pp. 86-87.

79. *Ibid.*, pp. 99-100.

80. *Ibid.*, pp. 99-100.

81. *Ibid.*, pp. 105-106.

82. *Ibid.*, p. 88.

83. *Ibid.*, p. 88.

84. *Ibid.*, pp. 87-88.

85. Schaeffer, *op. cit.*

The discussion of the whole question in the following pages is based on the views of Schaeffer expressed in the above-named work. Writing about the commencement of the Iron Age in the Talish basin, Schaeffer expresses the view in the following words, (*Ibid.*, p. 436):

"D'apres ce que nous disions plus haut, nous sommes amené ainsi à les placer vers la fin du XIIIe siècle au plus tot au XIe au plus tard, ou en chiffres ronds entre 1200 et 1000 avant notre ere. Nous appellerons cette periode le Talyche Fer I. Cette estimation est confirmée par les indices chronologiques que nous pouvons tirer de l'examen typologique des trouvailles de Chagoula-Derré."

The tombs of Tulu were earlier attributed by De Morgan to a transitional phase between the Bronze and Iron Ages, and dated between 1350 and 1200 B.C., but have been dated by Schaeffer to 1250-1100 B.C. (*Ibid.*, pp. 438-439).

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The tombs of Chir-Chir-Pori, originally raised in the Bronze Age, were re-used in the Iron Age, (*Ibid.*, p. 439).

The tombs at Agha Evlar reflect a similar sequence of events (*Ibid.*, pp. 439-442).

86. Schaeffer, *Ugaritica*, I, pp. 110 ff.

87. Schaeffer, *Stratigraphie Comparée etc.*, p. 307.

88. The incursion of the Sea folks was stopped at the Egyptian frontier first by Minephtah about 1229 B.C., and then by Rameses III in the 8th year of his reign (1198-1167 B.C.), *Ibid.*, pp. 307-435.

89. Ghirshman, *Iran*, 1954, p. 64; Schaeffer, *Stratigraphie Comparée* etc. p. 436. Schaeffer states that the upheaval marking the end of the Bronze Age and bringing in the Iron Age coincides with the downfall of the Kassites in Babylon, after a hegemony lasting for six centuries.

The inference about the general introduction of the Iron Age about 1200 B.C. is confirmed by the results of excavations at several sites, including those in Persia. Schaeffer, *Ibid.*, p. 436, says "*Nous verrons plus loin . . . qu'au plusiers sites persan au Sud du Talyche, dans le Nihavend, et le Luristan, on a relevé les traces d'une conflagration analogue qui surprit la civilisation du Bronze à son declin et causa son "emplacement par celle du Fer*".

90. Schaeffer, *op. cit.*, p. 392, foot note 2. To quote his actual words:

"*Il est bien entendu que le chiffre de 1200 a été choisi pour aider la mémoire. Les événements qui marquent le début de l' Age du Fer en Syrie, comme en Chypre et ailleurs, ont commencé au cours du XIIIe siècle et ont duré jusqu'au commencement du XIIe comme les chroniques égyptiennes nous l'apprennent, En fait, donc, si nous disons 1200 nous visons la période entre 1250 et 1175 environ.*"

91. Schaeffer, *op. cit.*, pp. 439-441.

92. *Ibid.*, pp. 433-434.

93. *Ibid.*, pp. 466-7, 533, under Fer Ancien: 1200-1100; The form of the poignards (daggers) is described on p. 433 of the vol. in question in the following words: "*Orné à la base de la lame d'un croissant en relief fait de bronze et à l'extremité du manche d'un pommeau egalement au bronze.*"

94. *Ibid.*, p. 455.

95. *Ibid.*, p. 467.

96. R. Ghirshman, *Fouilles de Sialk*, II, pp. 44-5, wherein he states "*à cette epoque, le fer est relativement precieux.*"

97. Schaeffer, *Ibid.*, p. 527.

98. The types of carvings on the seals in Persia, with comparable specimens elsewhere, have been illustrated in fig. 30, p. 410, of *Stratigraphie Comparée* etc.

99. *Ibid.*, pp. 411, 472.

100. *Ibid.*, fig. 30, nos. 3 and 7 and pp. 410-411.

101. *Ibid.*, p. 411.

102. G. Conteneau and R. Ghirshman, *Fouilles du Tepe Glyan*, Paris, 1935, pls. 22; 38, fig. 1, 2, 4; Schaeffer, *op. cit.*, pp. 411-412.

103. Schaeffer, *op. cit.*, p. 472.

104. R. Ghirshman, *op. cit.*, Vol. II, pl. XXXI; Schaeffer, *op. cit.*, pp. 472-473.

105. Schaeffer, *op. cit.*, p. 475.

106. *Ibid.*, pp. 475-476.

107. *Ibid.*, p. 469.

108. *Ibid.*, p. 475.

109. *Ibid.*, p. 472.

110. *Ibid.*, p. 474.

111. *Ibid.*, pp. 474-475.

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112. H. V. Vallois, Les Ossements humains de Sialk, in *Fouilles de Sialk*, II, pp. 113 ff.

113. Ghirshman, *Iran*, p. 63.

114. *Ibid.*, p. 73.

115. V. Gordon Childe has discussed the question in great detail in *The Aryans*, London, 1926.

116. They are referred to in the Akkadian business documents of the Assyrian commercial colony in the form of cuneiform tablets found at Kueltepe, near Mazaka. See Seton Lloyd in *Early Anatolia*, a Pelican Book, 1956, pp. 12, 67, 112-114.

117. *Encyclopaedia Britannica*, 1959, Vol. 11, p. 598 B.

118. E. Forrer, *Die acht Sprachen der Boghaz Keui Inschriften*, 1919. The eight languages comprise (1) Sumerian, (2) Luwite, (3) Palaite, (4) Proto-Hittite, (5) Hurrite, (6) Akkadian, (7) Indo-Iranian and (8) Nesite.

119. K. Bittel and H. G. Guterbock, *Boghaz Keui, Neue Untersuchungen in der Hethitischen Hauptstadt*, Berlin, 1915.

120. K. Bittel, *Grundzuege der vor-und fruehgeschischte Kleinasiens*, pp. 61 ff.; A Goetze, *Kulturgeschichte des Alten Orients; Kleinasien*, p. 63.

121. The name Mitanni was derived from the name by which the Mitannian rulers called themselves in thirteen of the letters found in the Egyptian archives at Tell-el-Amarnah.

122. B. Hrozny thought that it was the same as Ras-el-Ain on the Habur.

123. The word *Maryannu* means chariot warriors in the Hittite and Egyptian texts and the word *Marya* in the *Rigveda* means the retainers of Indra. The close connexion between the two words is significant.

The Mitannis were the first to introduce the horse and chariot in the Near East. Though chariots were known from an earlier date both at Mari and Chagar Bazar, the horse was not mentioned in the comprehensive code of Hammurabi (1690 B.C.)

The fact that the Hittites had to depend on the Mitannians for the training in horse riding or yoking it to the chariot, as indicated by the text of Kikkuli, points to the importance of the improved technique and speed of wars made possible by this novel means of warfare.

The possession and mastery of the horse and chariot gave them military superiority and consequentially a raised status in social life, which enabled them, in spite of their numerical weakness, to hold their own against the odds and wrest the ruling power from the Hurrians.

Not a little of it may have been derived from the earliest examples of weapons forged in iron, attributed by Schaeffer to Mitannis (see page 107 ante). O'Callaghan in *Aram Naharaim, Analecta Orientalia*, 26, 1948, Rome, p. 68, makes a pointed reference to this phenomenon. The Mitannis' introduction of the horse, chariot and iron into Egypt is also referred to by P. K. Hitti in *History of Syria*, London, 1951, p. 146.

124. *Naharina*, the land of the Mitannis, is also called Hannigalbat in Assyrian inscriptions.

125. It was a political expedient essential for the survival of the dynasty, sandwiched between two powerful rivals, namely, the Egyptians on the one hand and the Hittites on the other, both of whom were interested in aggrandizement.

126. While the Mitanni house was weakened by family feuds, the Hittites were reinvigorated by the policy of active aggrandizement pursued by Suppiluliuma (1375-1335 B.C.).

127. E. F. Weidner, *Politische Dokumente aus Kleinasien*, Leipzig, 1923.

128. The remains of the Eastern Mitannian kingdom were apparently

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annexed by Ashur Ubalit (1380-1341 B.C.) of Assyria, who called himself a Hannigalbatean or Mitannian.

129. W. Wuest, Ueber das Alter des Rigveda und die Hauptfragen der indoarischen Fruehgeschichte, *W.Z.K.M.*, XXXIV, 1927, p. 169.

130. H. Winckler, *Mitteilungen der Deutschen Orientalischen Gesselschaft zu Berlin*, no. 35, 1907, p. 51.

131. *Rigveda*, VIII, 26, 8.

132. See *Archiv. Orientalni*, III, 1931, pp. 431 ff.

133. N. D. Mironov, Aryan Vestiges in the Near East of the second Millenary B.C., *Analecta Orientalia*, Vol. XI, 1935, pp. 140-217. He expresses the view that the Indian character of the numerals is obvious.

134. J. Friedrich, Arier in Syrien und Mesopotamien, *Reallexikon der Assyriologie*, I, p. 148. He is of the view that the adaptation of the horse to the chariot appears to have been made by the Indo-Europeans (Mitanni) in the 18th century B.C., when they came into the region. By the time of the Amarnah letters they were culturally and linguistically completely assimilated.

135. N. D. Mironov, *op. cit.*, pp. 140-217, has made a list of the proper names among the Mitanni, of which seven are names of Mitanni kings, and four are of their deities, a geographical name, and five common names of Indo-European, all of affinity, that occur in the Tell-el-Amarnah letters and in other epigraphs. He was, however, of opinion (p. 24) that though the principal element in these names was Indian, there was also side by side an Iranian, split into two tribes, namely, the western and the eastern, respectively (see Mironov, *op. cit.*).

Mironov concludes (*op. cit.*, p. 214), "The linguistic facts discussed above seem to corroborate the conclusion Konow draws from the (supposed) fact of the Aswins (Nasatya) being mentioned in the Boghaz Keui treaty as groomsmen that the extension of the Indo-Aryan civilization into Mesopotamia took place after the bulk of the Rigveda had come into existence. The oldest portions of the collection would certainly have to be considered as considerably older than the Mitanni treaty." See also Sten Konow, Mitanni, *Kristiania*, 1921.

R. T. O'Callaghan, writing in *Aram Naharaim, Analecta Orientalia*, no. 26, Rome, 1948, refers to the recovery of 2,989 names at Nuzu, a Hurrian establishment near Kirkuk, out of which 1500 were Hurrian, 631 Akkadian, 23 Sumerian, 53 Kassite, 27 Indo-European and 754 were unclassified names. In all about 81 names, including those from other sources, could so far be identified as akin to Indo-Aryan forms (see p. 56-63 of *Aram Naharaim*).

He adds, keeping in view Mironov's interpretation, "Although it is readily to be conceded that a certain amount of conjecture underlies such attempts to identify with precision these 81 personal names, since most of the deviations are hypothetical, still there is no denying that the majority of cases provides us with names unmistakably Indo-Aryan in character". He indicates that although Hurrian names were also among the ruling princes, "the Indo-Aryans were the governing element" (p. 65), deriving their superiority from the mastery over the horse and chariot and the use of iron (p. 68).

136. O'Callaghan writes, *op. cit.*, p. 35, foot note 2, "The supremacy which the Indo-Aryans gained over the Hurrians in the Mitanni was due to the chariot and *to the earliest use of weapons forged in iron.*" (Italics mine).

137. It occurs in the inscription in the form of *Na - Sa - at - ti - an - na*. The form *na* is the plural termination (E. Forrer, 250, no. 16).

138. Please see the divergent views on the subject in note 142 below.

139. A. Goetze, *Kulturgeschichte des alten Orients: Kleinasien*, p. 63.

140. N. D. Mironov, *op. cit.*

141. Ghirshman, *Iran*, pp. 64-65.

142. Many divergent views have been expressed on this point. J. Friedrich

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writing in the *Reallexikon der Assyriologue*, I, Berlin, 1928, brings together the views of several scholars.

Edward Meyer (p. 146) holds, on the ground of the retention of the 'S' sound in the names *Subandhu, Sutarna, Suwardata, Satya, Sattawartana*, etc., that the people had not yet separated themselves as Iranians and *Vedic* Aryans, and were the old Indo-Europeans.

W. Porzig (p. 147) holds the view that they were unseparated Aryans at home in Syria. It is further pointed out that the sequence of *Mitra-Varuna* is exactly as in the *Rigveda*. But *Varuṇa* is unknown to the Iranians. Besides, the form *Satta* in *Sattawartana* points to a later Prakrit (*Mittelindisch* or the language of the middle period as he expresses it) form, on the assumption that the cuneiform form of this word is correctly rendered, while the pronunciation of 'S' in the proper names points to an earlier date. Their separation into Iranians and Indians (*Vedic* Aryans) took place after the Mitanni period. In this connexion it may be pointed out that F. B. J. Kuiper does not see in the form *-tta*, for *-pta* in *Satta*, any contribution of the Middle-Indian Prakrit and adduces the occurrence of this form in the word *abhyatta* in the *Chhāndogya Upanishad*, 3, 14, 2, as pointed out by Oertel in *Studia Indo-Iranica*, pp. 134 ff. On this ground there cannot be any justification for seeking a connexion about 1400 B.C. between Mitanni and Middle-Indian Prakrit (Kuiper, Review of Albert Thumb, *Handbuch des Sanskrit*, Revised Edition, 1958, by Richard Hauschild, Heidelberg, 1958, in *Lingua, International Review of General Linguistics*, December 1959, p. 432).

P. Kretschmer (p. 147) holds the view that the Aryans (Indo-Aryans) had once settled in Syria, and uninfluenced by the cultural and religious influences of the neighbours moved away towards India, while those that were left behind were Mitanni.

Friedrich himself (p. 148) is of the view that since the 'Aryans' of Syria in the Amarnah period are not described by any distinctive name; they had been by that time completely absorbed and assimilated by the local people, and the remains of their language were only the fossil witness to an earlier individuality.

In this connexion O'Callaghan (*op. cit.*, p. 69) writes, "yet within the scope of our study, it is important to emphasize that these personal names show there was an early wave of Indo-Aryans migrating into Mesopotamia several centuries in advance of an Iranian movement proper".

He quotes Professor Dumont in note on p. 70, *Ibid.*: "Professor Dumont has suggested that either those Indo-Aryans may have not penetrated east into India, but stayed in Mesopotamia (and this would explain their early presence there) or else that they may have penetrated into India and then migrated westward again. This would explain the *Vedic* character of the Mitannian gods".

It is also to be considered that the Aryan immigration into India has to account for the preceding Zoroastrian schism in Iran. If the supposed exodus of the Aryans from Mitannian-Syria has to be set at all after 1365 B.C., the date of the Mitannian discomfiture at the hands of the Hittites, several centuries have to be stipulated for the Iranian bifurcation from the parent stock and the date thus worked out for the entry of the Aryans into India would be too late in consideration of the archaeological evidence in hand, nor would the time-lag, in that eventuality, be sufficient to account for the rise of Buddhism and Jainism respectively, which has been set down to the 6th century B.C. There is no case, therefore, for an Aryan immigration from that direction or about the time (*circa* 1365 B.C.) either.

Such a view has, however, been expressed by R. Hauschild in *Handbuch*

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des Sanskrit, 1958, pp. 47, and 130, but the improbability of the idea has been pointed out by F. B. J. Kuiper, *op. cit.*, p. 431.

143. Ghirshman, *Iran*, p. 61.

144. *Ibid.*, p. 62.

145. *Ibid.*, p. 63.

146. *Ibid.*, p. 74.

147. *Ibid.*, p. 70.

148. *Ibid.*, pp. 70-71.

149. E. F. Schmidt, *Excavations at Tepe Hissar-Damghan*, Philadelphia, 1937, p. 325; Schaeffer, *Stratigraphie Comparée* etc., p. 451.

150. Ghirshman, *Fouilles de Sialk*, II, pp. 18-19; K. Bittel, Boghaz Koey, *Abhandlungen der Preuissischen Akademie der Wissenschaften*, Berlin, 1935, p. 36.

151. Ghirshman, *Ibid.*, pp. 29 ff; *Iran*, p. 80.

152. Ghirshman, *Iran*, pp. 86-88.

153. H. D. Sankalia, *op. cit.*

154. The Aryans are spoken of here as elsewhere only as a symbol of linguistic affinity and, to the extent permissible, also a cultural entity.

155. A. B. Keith, The Home of the Indo-Europeans, *Oriental Studies in Honour of Cursetji Erachji Pavry, London*, 1930, p. 199.

156. A. B. Keith, The Home of the Indo-Europeans, *I.H.Q.*, March, 1937, no. 1, p. 30.

157. Keith, The Home of the Indo-Europeans, *Oriental Studies in Honour of Cursetji Erachji Pavry*, London, 1930, pp. 195-196.

158. A recent work summarizes the up-to-date cross-currents of scholars' views on this subject, between 1940 and 1956, in *Kratylos, Kritisches Berichts und Rezensionsorgan fuer indo-germanische und allgemeine Sprachwissenschaft, Jahrgang* 1, Heft 1, 1956, by Otto Harrasowitz, Wiesbaden.

More recently some views favouring an Indian home for the Aryans have been expressed in the Indian History Congress, Delhi 28-31, December, 1961.

Though no substantial argument has been cited, endeavour has not been spared to plead the cause for an original home in the region known as *Sapta Sindhu*, for a later migration from this centre to different parts of Asia and Europe, and for the theory of co-existence between the Aryans and the Harappans for about five centuries (2000-1500 B.C.). See S. D. Giyani, New Light on the Aryan Problem, *Indian History Congress*, Twenty-fourth session, 1961, Summaries of Papers, p. 6.

H. K. Bhattacharya, in "Similarities of words in the Indo-European Languages and the concept of one cradle", *Ibid.*, pp. 6-7, pleads, however, against a common home and explains the linguistic similarities among divergent peoples as due to grammatical peculiarity.

Swami Sankarananda in *Mythological Aryans, Ibid.*, p. 7, reiterates the stand that the original home of the *Vedic* reciters was in the delta built by the Indus and Sarasvatī.

159. B. G. Tilak, *Arctic Home in the Vedas*, Poona, pp. 453-455.

160. Strzygovski, *Hirt Festschrift*, I, p. 174.

161. T. H. Engelbrecht, *Die Urheimat der Indo-Germanen*, Glueckstadt, 1933.

162. Penka, *Origines Aricae*, 1883; T. H. Engelbrecht, *op. cit.*, expresses the view that the coastal regions of Sweden appear to have been inhabited by the superior Aryans, who, by and large, moved from this region into India in the course of their adventurous expansion following the line of the least resistance.

163. K. F. Wolff, *Amman Festgabe*, Innsbruecker Beitrage zur Kulturwissenschaft, Bd. 2, 1954, p. 191.

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164. G. Kossina, *Die Indo-Germanen.*

165. H. Hirt, *Indo-Germanische Grammatik.*

166. P. Giles in *Cambridge History of India,* I, pp. 67 ff.

167. J. de Morgan, *Prehistoric Orientales,* pp. 172 ff; Des Origines des Semites et de celles des Indo-Europeans, in the *Revue Synthese Historique,* Vol. XXXIV, nos. 100-102 (Reprinted *Ephemerides Bibliographigues,* Jun.-July, 1923).

168. Adolf Pictet was the first to look for the Indo-European home in Asia, between the Hindukush and the Caspian Sea, as far back as 1859.

169. E. Waldschmidt, for instance, believes that the home lay between the Volga and the Carpathian ranges, *Historia Mundi,* II.

170. Nehring, *Studien zur Indo-arischen Kultur und Urheimat,* pp. 27, 59-61.

171. O. Schrader, *Sprachvergleichung und Urgeschichte,* Jena, 1883.

172. H. Peake and H. J. Fleure, *The Steppe and the Sown.*

173. G. A. Grierson, writing in the *Linguistic Survey of India,* Vol. I, part 1, 1927, on the Indo-European family, said that the Aryans were to be traced to South Russia. They came first into Afghanisthan and entered India through the Kabul valley in several waves, and he was in agreement with the view that the Indo-Aryan elements in the names and Gods of Mitanni are of *Vedic* origin.

174. V. G. Childe, *The Aryans,* London, 1926, Chapter, VIII. According to him the southern parts of Russia, extending upto the Caucasus, was the settlement centre of the Indo-Europeans. They discovered their way from there to the Indus valley as well as to the Mitanni area in Mesopotamia. They spread in all directions from this centre through the Caucasus.

175. B. K. Ghosh, The Aryan Problem, *The Vedic Age, The History and Culture of the Indian people,* 1951.

176. Richard Hauschild, Revised Edition of Albert Thumb's *Handbuch des Sanskrit,* Heidelberg, 1959.

177. W. Brandenstein, in Die erste Indo-germanische Wanderung. *Klotho,* II, Vienna, 1936, held the view that the Kirghiz steppe marked the original home. From here one band moved towards Poland in the west in the 3rd millennium B.C., and another went over the Caucasus towards the east to form the ancestors of the Indo-Iranians. See *Studien zur Indo-germanische Grundsprache,* Vienna, 1952, pp. 23-25, wherein he reiterates the standpoint calling it the Eurasian Steppe-land.

177a. E. Forrer, *Sitzungs Bericht der Preussischen Akademie der Wissenschaft,* 1919, p. 1036; *Zeitschrift fuer Deutsche Morgenlandische Gesselschaft,* LXXVI, p. 247; *Orientalische Literarische Zeitschrift,* 1924, pp. 113-118.

177b. Paul Kretschmer, Varuna and die Urgeschichte der Inder, *Wiener Zeitschrift fuer Kunde des Morgenlandes,* XXXIII, 1926, pp. 1-22; A. B. Keith, Mitanni, Iran and India, *Modi Memorial* Volume, 1930, pp. 92 ff.

177c. E. Meyer, *Geschichte des Altertums,* p. 35.

178. E. Herzfeld, *Iran in the Ancient East,* pp. 191-192.

179. H. Heine-Geldern, *op. cit.,* 1936, p. 109.

180. J. Charpentier, The Original home of the Indo-European, *Bulletin of the School of Oriental Studies,* IV, 1926, p. 164.

181. E. Horrowitz, The Aryan Origins, *Modi Memorial* Volume, pp. 16 ff.

182. A. H. Sayce, The Early Home of Sanskrit, *Modi Memorial Volume,* pp. 68 ff.

183. Aurel Stein, The Indo-Iranian Borderlands, their Prehistory in the light of Geography and of recent Explorations, *J.R.A.I.,* 1934, pp. 179-202.

184. Leonard Woolley, *A Forgotten Empire,* A Pelican Book, pp. 31-35. Though the Khirbet Kerak ceramic is named so after its findspot in Palestine,

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its real home seems to have lain in the southern Caucasus region. It is a hand-made pottery either wholly red or partially black and partially red, partaking of the characteristics of a black-and-red ware. Woolley states (p. 34) "in the Khirbet Kerak people we must recognize the ancestors of the Hittites", and again "it has long been recognized that the Hittites were a Caucasian stock which moved thence into Asia Minor".

185. F. E. Pargiter, *A.I.H.T.*, London, 1922, pp. 296-302.

186. T. Burrow, *The Sanskrit Language*, London, pp. 1-34.

187. Tocharian, also called Tochari or Tocharish, is the name of an Indo-European language spoken in the Tarim basin during the latter half of hte 1st millennium A.D. The documents date from about 500-700 A.D., and were discovered towards the end of the 19th century. This language was probably in contact with the Celtic and Italic dialects on the one hand and the Balto-Slavonic on the other, as also with the Germanic and Greek languages of antiquity: The Tocharian speakers migrated to the east over a northern route. It had come into touch with non-Indo-European speakers as well, especially the Finno-Ugric and Altaic. It is a *Satem* dialect, and, from its ultimate habitat, can be said to have strayed wide away from its original home (See *Encyclopaedia Brittanica*, 1959, Vol. 22, pp. 268-269).

188. B. K. Ghosh, *op. cit.*, pp. 202-217.

189. One of the unresolved riddles of Iranian history, which is of equal universal interest, is the date of the birth of Zoroaster, who was responsible for the schism with the *Vedic* way of life. E. Herzfeld, writing on the Traditional Date of Zoroaster in *Oriental Studies in Honour of Cursetji Erachji Pavry*, London, 1930, pp. 132-36, favours the view that Zoroaster lived 258 years before Alexander, whose era begins with 312 B.C. and on this basis the date works out to 570 B.C. But recent excavations in Persian Azerbaijan, about 250 miles (about 402 km.) north-west of Teheran by the German Archaeological Institute (See *Universitas*, A German Review of the Arts & Sciences, Stuttgart, Vol. 4, 1961, no. 3, pp. 330-1) have adduced evidence to support the other date of 630 B.C. in vogue. At any rate, Zoroaster lived a considerable time before 521 B.C., when Darius ruled, as the Behistun inscription makes a reference to Zoroaster. J. H. Moulton, *Early Zoroastrianism*, London, 1913, places him between 660 and 583 B.C. and indicates the possibility of a still earlier date.

190. E. Herzfeld, *The Archaeological History of Iran, 1935*. The annals of Shalmaneser III (858-24 B.C.) mentions two of the Iranian tribes, Amadai Mada and Parsuas-Parsa, who occupied the land of the Medes and Persia respectively. These became an Assyrian province in 755 B.C. under Sennacherib. The region east of the Caspian gates was called Khwar which is called Hvara in Old Persian but Svara in Aryan speech. But the mountains are known as Patishvara. In Esarhaddon's annals they are called *patusarra* and in Darius's inscription of Behistun as *patishvara*. The retention of the 'S' sound at this date in the language shows that the Persian immigrants into the region spoke an Aryan dialect, and their bifurcation from the Indo-Aryans could not have been very old.

191. B. K. Ghosh, *op. cit.*, p. 203. He says, "From a purely linguistic point of view the *Rigveda* in its present form cannot be dated earlier than 1000 B.C."

192. B. G. Tilak, *op. cit.*, pp. 453-455.

193. H. Jacobi, in *Ind. Ant.*, June 1894, pp. 154 ff., says, "the period of civilization extended accordingly from about 4500 to 2500 B.C. and we shall perhaps not be far wrong if we put the collection of hymns which has come down to us in the second half of this period."

G. Buehler lent support to this date-scheme of Tilak and Jacobi in his note

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on Professor Jacobi's Age of Veda and on Tilak's Orion, in *Ind. Ant.*, XXIII, pp. 283 ff., though he suggested the need of fresh investigations.

194. D. N. Mukhopadhyaya, The Hindu Nakshatras, *Journal, Department of Science, Calcutta University*, 1923.

195. J. Halevy expresses a doubt as to the correctness of the identification of the deities of the Boghaz Keui text with those in the *Ṛigveda*, (*Revue Semitique*, 16, 1908, pp. 247 ff.); Jacobi, Sten Konow and Oldenberg, among others, are, however, in agreement.

196. Walter Wuest in Ueber das Alter des Rigveda, *W.Z.K.M.*, XXXIV, 1927, pp. 165-214, states that several *maṇḍalas* of the *Ṛigveda* had been composed in the Mitanni period in Mesopotamia but the bulk of the hymns were composed later in India. He is, however, in agreement with the suggested dates of the Mitanni period in Mesopotamia.

Jarl Charpentier, *op. cit.*, p. 167, states that the Aryans entered India in or about 2000 B.C., or perhaps one or two centuries earlier.

197. Walter Fairservis (Jr.), The chronology of the Harappan Civilization and the Aryan Invasion, *Man*, LVI, Nov. 1956, pp. 153-156. He bases his arguments of the suggested chronology of the terminal phase of the Harappan culture on the grounds of the find of a Carbon date, approximating to *circa* 2100 B.C., for Damb Sadat II. He argues that the Harappa culture must, on this showing, have commenced at Harappa itself about 2000 B.C. and the presently accepted date of *circa* 1500 B.C. gives too short a life for the Harappa culture, considering its great spatial expansion. Hence a date around *circa* 1200 B.C. or even later would be suitable for the end of the Harappan civilization.

Fairservis' reference to several cultural traits in Quetta of the post-Harappan phase, has been mentioned and shown to be of the order of 'cultural fragmentation' that set in following upon the discomfiture of Harappa.

198. R. Heine-Geldern, *op. cit.*, 1936, p. 106. It was, however, G. Huesing, who had first attributed the impulse of the Indo-European wandering into India to the invasion of Asia Minor and Armenia by the Thraco-Phrygians in the 12th century B.C. (1190 B.C.). Heine-Geldern considers a time of about fifty years as a sufficient time-lag for the incursion to be completed.

199. D. C. Sircar, *Select Inscriptions*, 1942, pp. 3-14.

200. *Ṛigveda*, V, 53.

201. *Ṛigveda*, V, 5, 3, 9.

202. *Ṛigveda*, VI, 27, 8; *Vedic Index*, I, pp. 29, 504, 521.

203. *Ṛigveda*, VIII, 6, 46, and elsewhere.

204. *Vedic Index*, I, p. 518.

205. *Ṛigveda*, VII, 83, 1,

206. *Atharvaveda*, V, 22, 5, 7, 9.

210. *Yasht*, VII, 32.

211. M. Winternitz, *op. cit.*, I, p. 41.

212. B. K. Ghosh, *op. cit.*, p. 203.

213. D. H. Gordon, *The Prehistoric Background* etc., p. 94.

The idea of the Iranians and Indo-Aryans separating themselves before reaching the soil of Iran as suggested by Burrow (see ante page 136) are not based on firm grounds. There is, however, no direct evidence to support this statement. The fact of their common existence prior to separation is amply clear. The absence of any reference to a foreign country, or to their original home before their migration into India, points to their coming across identical environments in their new home as not to feel differently. The motive of the bifurcation, however, is provided to an extent by their differences in religion. The folk movement, which had inspired their onward movement, had possibly a distant focus in Asia Minor as indicated before. As has been seen the folks

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which caused this movement also helped in the dissemination of the knowledge and use of iron throughout. The benefits of the novel technological advance which iron bestowed was scarcely to be lost upon the Aryan folks, especially as the new movement did result in the settlement in Iran of a people, namely, the Sialk VI B folks, who were undoubtedly well acquainted with the use of iron. As a matter of fact, iron had already come into vogue in this region still earlier in Sialk V A levels. Against this background, it may be stated that the use of iron was increased and accentuated by the newcomers in Sialk VI.

Regardless of the direction of the movement of the Aryans into India, there was more than a fair chance for the incoming Aryans to have acquired their acquaintance with the use, and possibly of manufacture too of iron on the way from the very folks who pushed them from behind.

It was also seen that the use of iron was known commonly almost throughout Iran about 1200 B.C., as inferred from the evidence in Koban, Luristan, Tepe Giyan and Sialk, as considered already earlier in this chapter.

214. W. Wuest, *op. cit.*, pp. 165-214.

215. Geiger, *Grundriss der Iranischen Philologie*, II 375.

216. E. Herzfeld, *Z.D.M.G.*, 80, 267 ff.

217. Wuest, *op. cit.*, p. 171; A. Hillebrandt, The Date of the Brahmanas, *Z.D.M.G.*, 81, p. 73.

218. Grierson, *op. cit.*, Vol. I, part I, p. 115.

219. Brunhofer, *Arische Urzeit*, 1910.

220. G. Huesing, *Mitteilungen der Akademischen Gesselschaft in Wien*, XLVI.

221. *Anabasis*, VI, 24.

222. J. Charpentier, *op. cit.*, p. 166.

223. R. Heine-Geldern, *op. cit.*, p. 106.

224. A Stein, *op. cit.*, pp. 179-202.

225. *Ṛigveda*, X, 75.

226. A. Stein, *op. cit.*, p. 197. He goes on to say, 'It is from the same designation of *Arya*, as likewise claimed by this population, that the name Iran for the whole country is derived'.

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CHAPTER 6

LITERARY EVIDENCE ON THE USE OF IRON IN ANCIENT INDIA

The *Ṛigveda* mentions *ayas*[1] repetitively as one of the metals in different contexts. It has been variously interpreted to connote iron, copper or metals in general. Monier Williams[2] translated *ayas* as iron, metal, an iron weapon, gold and steel. Gordon Childe thought that it referred to copper[3].

M. N. Banerjee[4] sought to prove that of the three metals mentioned in the *Ṛigveda*, namely, *hiraṇya, rajata* and *ayas*, the last named could not be any other than iron. From several references to *ayas* in the *Ṛigvedic* literature it becomes clear that it should be very hard, malleable enough to be beaten into vessels, and capable of being rendered sharp so that with swords or axes, described as *asi*[5] and *svadhiti*[6], respectively, the horse at sacrifice could be decapitated at a blow, and with razors (*kshura*)[7], made of iron, heads could be shaven clean. The strength and sharpness of *ayas* became standards of comparison and qualities to be coveted. Gold and silver are easily ruled out by these standards. It is also stated that *ayas* was purified by smelting and that it could be welded. Copper by itself could not perhaps come up to the utilitarian and qualitative expectations in respect of the *ayas* of the *Vedic* bards. Bronze was obviously out of the question, as tin, an essential component of bronze, in combination with copper, is not separately mentioned in the *Ṛigveda*. The fact that the mixed metal or alloy has no separate term to denote it in the *Vedic* literature is quite significant in this context. Furthermore, the smith who produced objects of *ayas* is called *karmāra*[8] in the *Ṛigveda*, a term which has come down to our times in the slightly modified forms, *kāmār* in Hindi and *Kāmār* in Bengali, etc. In Tamil the blacksmith is called *kollan*, though *kammān* also stands for a blacksmith, while *kammāḷan* covers the blacksmith as well as any metal worker. Thus the phonetically connected synonyms signify the blacksmith whose sole or prime business was to deal principally with iron.

The process of smelting (iron) ores mentioned in the *Ṛigveda* is shown by Banerjee to be remarkably akin to the methods of the indigenous smelters of iron in contemporary India, as will

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be seen in Chapter 9, only to suggest a continuity of the tradition. The process[9] described in the *Ṛigveda* would imply the use of "medicinal plants"[10] as fuel, "shining stones"[11] as ore and "fans of geese feather"[12] as bellows. It only suggests an open hearth furnace where a carbonaceous firewood was used to render the smolten or reduced metal from orestones hard and steely, and wherein, for introducing the blast, some contraption of bellows was used by the *karmakāra* or *karmāra* (smith). The tools and equipments, namely, *asi* and *svadhiti* etc.[13], mentioned in the *Ṛigveda* were such as would have the hardness which only such a metal would possess. The industry seems to have been confined to the *dhmātṛins*[14], who, as the analysis of the term would suggest, blew and 'hammered' to ply their trade and would, therefore, clearly be recognized as metal workers.

The fundamental difference between the metallurgy of copper and that of iron has been indicated above (see Chapter 1, pp. 1-2). Owing to the low smelting point of the copper ores it was dealt with by heating in some kind of crucible, and the desired objects were producd by pouring the liquid metal into moulds, and finished by hammering etc., when the metal had cooled and hardened in the cast. The excavations at Ujjain have shown the use of this method in the early years of Period III, i.e., after *circa* 200 B.C., when small terracotta or ceramic crucibles were employed for smelting copper. As a result of the high temperature to which heating was continued, the clayey component of the walls of the crucible became vitrified.

It has been shown that the Aryans should have had full knowledge of the use of iron before their advent into India. It should not, therefore, cause surprise if their earliest literature, which is admittedly later than their earliest days of acquaintance with iron, should bear ample though casual references to this metal, not being a treatise on metallurgy. In this context Banerjee's unequivocal identification of *ayas* with iron appears cogent and would be worth consideration. Even a metallurgist like R. J. Forbes[15] has admitted the cogency of iron being in use in India in the earliest days of the Aryans in the country.

Of the other *Vedas*[16], which evolved later than the *Ṛigveda*, the *Vājasaneyi Saṁhitā* of the *White Yajurveda* mentions six metals, namely, *ayas, hiraṇya* (gold), *loha* (copper), *śyāma* (iron), *sīsa* (lead) and *trapu* (tin).

Later still the *Brāhmaṇas* and *Upanishads*, which are admittedly of a later date than the *Vedas*, mention *lohitāyas* or *lohāyas* and *kārshṇāyas* or *kṛishṇāyas*[17], dividing the metals into the red metal and the black metal, respectively. These have been identified broadly as coper and iron, respectively. But the common

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Hindi and Bengali term *lohā*, no doubt, derived from *lohita*, has stuck to iron. Iron is red when it is heated red-hot, black or steel-grey when it is in normal temperature and reddish again when it is rusted. On the other hand copper is red or reddish brown when first manufactured, blackish when it is held in use and greenish when it rusts or oxidizes. As iron is black in cold and normal condition it may have been designated as *kārshṇāyas*, and copper, which is red when first manufactured, may have been called *lohitāyas*. It is possible, therefore, that *ayas* was used to cover both copper and iron to begin with i.e., in the *Ṛigveda*. It would *ipso facto* imply that the iron was already known.

The etymology of the word and its variants or equivalants in different languages, old and new, namely, *aes* in Latin, *er* in Old German, *Eisen* in modern German, iron in English, *ayan* in Old Persian (Bartholomew's Dictionary), all of which mean iron, would, however, plead in favour of the interpretation that *ayas* probably did mean iron in the oldest *Vedic* literature, though its use to denote a few other metals like copper or gold in suitable contexts is not ruled out.

Herodotus[18] wrote that the Indians in the Persian army were armed with cane arrows tipped with iron. This is the earliest literary evidence, after the *Vedas*, on the use of iron in India or by Indians. Even this would presuppose a time-lag of considerable extent during which iron was worked and the industry developed.

Ktesias,[19] who was in the court of Persia in the 5th century B.C., wrote that he was presented with two remarkable swords of Indian steel by the Persian king and his mother respectively. The manufacture of steel would imply a considerable knowledge and experience of the metallurgy of iron, as steel could have been produced only by an admixture of a proper percentage of carbon, which could be achieved only under high temperature in specially built furnaces. Thus the manufacture of steel objects in India would, on this evidence, go back to a still earlier date.

Quintus Curtius[20] mentions that Alexander of Macedon, after the victory over Porus of Taxila about 326 B.C., received from him a gift of 100 talents or 30 lbs. of steel. It may be noted that a uniformly victorious warrior of the position of one who had traversed and conquered the entire land between Greece and India could condescend to accept such an ordinary or paltry gift! Yet the same Alexander, before his advent on the Indian soil, had, after his loot and sack of Persepolis, allowed his soldiers to leave behind[21] thousands of arrow-heads and spear-heads of iron, in the course of the removal of the treasures of the palace, which had lasted for days, now recovered in the debris by excavation.

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The clearly deliberate abandonment of such precious equipments of warfare would only indicate that they were amply provided with equipments of iron. This would only mean that 'steel' was not produced at all or, if so, in inadequate quantities or of poor quality in the west, and that India at this time enjoyed a reputation for the manufacture of steel, which was then, as now, a coveted metal pointing to the long ancestry of the industry. In this context one can understand that the gift of Porus was not considered unworthy of royal acceptance, towards the end of the 4th century B.C.

Pliny[22] (first century A.D.) refers to fine swords made of Indian steel. The Periplus of the Erythraean Sea[23], the work of an unknown author, also of the 1st century A.D., describes the occurrence of Indian iron and steel in African ports and in Abyssinia.

There is evidence to show that the Romans imported iron and steel from India and made them into fine cutlery and armours at Damascus and Irenopolis[24]. Much of the Roman trade, however, was with peninsular India as indicated by the finds of Roman ceramics and coins etc.

Kauṭilya's *Arthaśāstra*[25] does indeed have references to the large-scale use of iron in his time, namely, during the rule of the first Maurya king, Chandragupta, though it is admitted that it may be a later compilation. The *Arthaśāstra* presents the picture of a society where mining was well established and subjected to state control. *Tīkshṇa dhātu*[26] is recognized as iron. "Those ores which are of orange colour (*kurumba*) or pale-red (*pāṁḍurohita*) or of the colour of the flower of *sinduvāra* (*vitex trifolia*) are the ores of *tīkṣhṇa*"[27]. The following indicates state undertaking of metal works. "The Superintendent of Metals (*Lohādhyaksha*) shall carry on the manufacture of copper, lead, tin, *vaikṛintaka* (mercury), *ārakūṭa* (brass), *vritta* (?), *kaṁsa* (bronze or brass metal) *tāla* (sulphurate of arsenic) and *lodhra* (?) and also commodities (*bhāṇḍa*) from them."[28] Among the objects made of iron, the armours are classed as *lohajālika*, *lohapaṭṭa*, *lohakavacha*, and *lohasūtraka*.

It is interesting to note that gold, silver, diamonds, gems, pearls, corals, conch shells, metals, salt and ores from the earth, rocks and liquids constituted mines in those days. That the mines were also under state control is clearly indicated, as the Director of Mines (*Ākarādhyaksha*) had not merely to prospect new mines but re-discover old ones by the signs of slags and ashes etc. He was also to be well-versed in the science of metallurgy[29].

The literary evidence regarding the use of iron in ancient India, steering clear of interpretational controversy, can take us

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back, at the remotest, to the period of the *Brāhmaṇas*, and at any rate, very much earlier than the date of the Buddha or Mahavira Jina as the practice of rituals and sacrifices must have been long enough in vogue to have provoked the new religious reforms of Buddhism and Jainism, respectively, which emerged largely in protest against the *Karmakāṇḍa* of the *Vedas*. This would incidentally also rule out the tentative suggestion by Wheeler that it was the Persians who introduced iron into India, as the Persian conquest of north-western part of the Indo-Pakistan subcontinent could scarcely be pushed back earlier than 531 B.C.

The existence of a brisk trade between the Roman empire and India in the early centuries of the Christian era involving the import by the former of ores and objects made of iron and steel from India is amply described by E. H. Warmington (*op. cit.* pp. 257-258). He writes: "The Roman trade in Indian iron and steel was the important one.... (the excellent Parthian metal was perhaps Indian). Evidently they (the Greeks) learnt the secret of production, for Saumaise points out a special treatise (in Greek) on the tempering of Indian steel..... The Romans worked it into fancy cutlery as Clemens shows, and perhaps into armour at Damascus (whither Indian metal was sent). The steel is called bright iron."

It is also interesting to note that almost contemporaneously, the Tamil works *Purānanānūru* (170, 11-15-17) and *Aganānūru* (224, 11, 2, 3) describe the iron worker, his anvil, bellows made of leather and other appurtenances.

Thus it is evident that literary accounts are not without their use in regard to the problem of dating the earliest uses of iron in India or of indicating its nature.

NOTES AND REFERENCES

1. Lallanji Gopal in his paper on the Antiquity of iron in India, in *Uttar Bharati*, Vol. IX, no. 3, pp. 71-86, has arrived at similar conclusions as the present author on the basis of archaeological and literary data on the date of the introduction of iron in India.

The word *ayas* has been repeatedly used in the *Ṛigveda* and has been variously interpreted. Some of the principal references to *ayas* are quoted below to indicate the contexts in which the word has been employed and the significance it tends to convey:

(i) *Ṛv.* IV, 2, 17:

Sukarmāṅaḥ surucho devayaṁ toyo
na devā janimā dhamaṁtaḥ
Śuchanto agniṁ vavṛidhanta
indramūrvaṁ gavyaṁ parishadaṁtoagman

Geldner, in *Der Rigveda*, I, p. 488, refers to *ayas* in this passage as ore which is smelted by fanning or blowing in fire.

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(ii) *Ṛv.* V, 62, 7:

Hiraṇyanirṇigayo asya sthūṇā
vibhrājate divyaśvājanīva
Bhadre kshetre nimitā tilvile
vā sanema madhvo adhigartyasya

This passage refers to the rule of *Varuṇa* and *Mitra* from a high stool or seat resting on a thousand pillars. The reference to *ayas* in this passage is to the ornamentation of the pillars of *ayas* with gold (*hiraṇya*).

(iii) Another reference to *ayasthūṇa* also occurs in *Ṛv.* V, 62, 8 as quoted below:

Hiraṇyarūpamushaso vyushṭāvayaḥ
sthūṇaṁ uditā sūryasya
Ārohatho varuṇa mitra
gartāmataśchakshāthe aditiṁ ditiṁ cha

Here the appellation *hiraṇyarūpaṁ* applied to *ayasthūṇaṁ* gives the story away as it indicates the pillars made of *ayas*, as shining resplendantly like gold in the rays of the rising sun.

(iv) *Ṛv.* VI, 75, 15:

Ālaktā yā ruruśīrshṇyartho yasyā ayomukhaṁ
Idaṁ parjanyaretas ishvai devyai bṛihannamaḥ

This occurs in a section dealing with the blessings of weapons, and refers to arrows tipped with *ayas* (*ayomukhaṁ*) which Geldner, *op. cit.*, II, p. 178, translates as iron.

(v) *Ṛv.* VI, 3, 5 describes *ayaso dhārā* in the following passage:

Sa idasteva prati dhādasishyaṅ
chhiśīta tejoayaso na dhārāṁ
Chitradhrajatiraratiryo aktoverna
drushadvā raghupatmajaṁhāḥ

Geldner, *op. cit.*, II, p. 95, translates *ayaso dhārā* as a blade made of iron, which is sharp as a flame.

(vi) *Ṛv.* VI, 47, 10 gives another instance of *ayaso dhārā:*

Indra mṛila mahyaṁ jivātumichchha chodaya
dhiyamayaso na dhārāṁ
Yat kiṁ chāhaṁ tvāyuridaṁ vadāmi tajjushasva
kṛidhi mā devavantaṁ

It is a supplication to Indra beseeching him to sharpen the intellect like the blades of objects made of *ayas*, which Geldner, *op. cit.*, II, p. 145, translates as iron.

(vii) *Ṛv.* V, 30, 15 brings out the word *ayasmaya*:

Chatuḥ sahasraṁ gavyasya paśvaḥ
pratyagrabhīshma ruśameshvagne
Dharmāschittaptaḥ pravṛije ya
āsīdayasmayastamvādāma viprāḥ

Here the word *ayasmaya* apparently refers to a vessel made of iron, which has been explained by Sayanacharya as a *kalaśa* (pitcher) for containing the *pravargā* milk.

(viii) *Ṛv.* X, 99, 6 contains the word *ayogra*:

Sa iddāsaṁ tuvīravaṁ patirdan
shalakshaṁ triśīrshāṇaṁ damanyat
Asya trito nu ojasā vṛidhanaḥ
vipā varāhamayoagrayā han

Here is a reference to the sharpness of speech which is said to be as sharp as an object with a tip of *ayas*.

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(ix) *Ṛv.* X, 87, 2 contains the word *ayodaṁshṭra:*

Ayodaṁshṭro archishā yātudhānānupa śpṛiśa
jātavedaḥ samiddhaḥ
Ā jihvayā mūradevān rabhasva
kravyādo vṛiktavyapi dhatsvāsan

It is a petition to fire to destroy the *Rākshasas* with the flames which have the teeth as strong and sharp as those of iron.

(x) *Ṛv.* X, 99, 8 contains the word *ayopāshṭi:*

So abhriyo na yavasa
udanyan kshayāya gātuṁ vidanno asme
Upa yatsīdadinduṁ śariraiḥ
śyenoyopāshṭirhaṁti dasyūn

Here *ayopāshṭi* is translated as one gifted with claws as strong and sharp as those of *ayas*, translated as iron by Geldner.

(xi) *Ṛv.* IX, 1, 2 contains the word *ayohata*:

Rakshohā viśvacharshaṇirabhi
yonimayohataṁ druṇā sadhasthmāsadat

Here the reference is to a wooden cradle or seat (of Indra) trimmed with *ayas.*

(xii) *Ṛv.* IX, 80, 2 also contains the word *ayohataṁ* as an adjective of *yoni* (vessel) in the same sense as above.

(xiii) *Ṛv.* VI, 71, 4 contains the word *ayohanu*:

Udu shya devaḥ savitā damūnā
hiraṇyapāṇiḥ pratidoshamasthāt
Ayohanuryajato maṁdrajihva
ā dāśushe suvati bhūri vāmaṁ

Here is a reference to *Savitar* with chins as strong as those made of *ayas.*

(xiv) *Ṛv.* VIII, 101, 3 contains the word *ayaḥśīrsha:*

Pra yo vāṁ mitrāvaruṇa jiro
dūto adravat ayaḥ śīrshā maderaghuḥ

Here *ayas* as an adjective of *śīrsha* (head) may refer to gold, instead of iron, and, therefore, would suggest the use of *ayas* in a general sense of metal, though Geldner, *op. cit.*, II, p. 430, has translated the word as iron. Nevertheless, the word can be, on this showing, stated to have covered both iron and gold.

xv) *Ṛv.* IV, 37, 4 contains the compound word *ayaḥśiprā:*

Pīvo aśvāḥśuchadrathā hi
bhūtāyaḥ śiprā vājinaḥ sunishkāḥ
Indrasya sūno śavaso napāto-anu
vaśchetyagriyaṁ madāya

This passage is addressed to the *Ṛibhus*, who are stated to have, among others, chins or noses, as explained by Sayanacharya, as though made of *ayas.*

2. Monier Williams, *A Sanskrit English Dictionary*, 1960, p. 85. He translated almost all combinations of the word as occur in the *Ṛigveda* as having to do with iron.

3. P. Neogy, in *Iron in Ancient India*, considered *ayas* to be iron, but the interpretation did not, as would normally be expected, find any ready acceptance, even though it was itself based on the assumption of Sayanacharya, commentator of the *Ṛigveda*, that it meant iron; V. G. Childe, *The Aryans*, 1926, p. 29n.

4. M. N. Banerjee, On Metals and Metallurgy in India, *I.H.Q.*, Vol. III, 1927, pp. 16 ff., 793 ff.; Iron and Steel in the Ṛigvedic Age, *I.H.Q.*, Vol. V, 1929, pp. 432 ff.; A Note on Iron in the Ṛigvedic Age, *I.H.Q.*, Vol. VIII, pp. 364 ff.

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5. The *Ṛigveda* contains several references to *asi;* and one is quoted below to indicate that it was indeed a strong weapon as claimed by M. N. Banerjee.

Ṛv. X, 79, 6 has the following passage:

Kiṁ deveshu tyaja enaśchakarthāgne pṛichchhāmi nu trāmavidvān
Akrīlan krīlan harirattave adanvi parvaśaśchakarta gāmivāsiḥ

Here the use of the *asi* is for cutting the bull into bits or joints.

6. The use of *svadhiti* is mentioned repetitively in the *Ṛigveda;* and a few are quoted below:

(i) *Ṛv.* IX, 96, 6 contains the word *svadhitirvanānāṁ:*

Brahmā devānāṁ padavīḥ kavīnāṁ ṛishirviprāṇāṁ mahisho mṛigāṇāṁ
Śyeno gṛidhrāṇāṁ svadhitirvanānāṁ somaḥ pavitramatyeti rebhan

Sayanacharya explained that *svadhiti* was the name of the axe which was used extensively for the clearance of forests.

(ii) *Ṛv.* III, 8, 11 mentions the words *tejamānaḥ svadhitiḥ*

Vanaspate śatavalśo vi roha sahasravalśā vi vayaṁ ruhema
Yaṁ tvāmayaṁ svadhitistejamānaḥ pra-ṇināya mahate saubhagāya

Here the destruction of large trees with the sharp and hard strokes of the *svadhiti* is referred to.

(iii) *Ṛv.* I, 162, 20 has the following passage:

Mā tvā tapatpriya ātmāpiyaṁtaṁ mā svadhitistanva ā tishṭhipatte
Mā te gṛidhnuraviśastātikāya chhidrā gātrāṇyasinā mithūkaḥ

Here the use of both *svadhiti* and *asi* in the horse sacrifice is indicated. They are also stated to be efficient enough to perform their jobs at a blow, without making the animal suffer the agony for long.

7. *Ṛv.* VIII, 4, 16 mentions the *kshura*:

Saṁ naḥśiśīhi bhurijoriva kshuraṁ rāsva rāyo vimochana
Tve tannaḥ suvedamusriyaṁ vasu yaṁ tvaṁ hinoshi martyaṁ

It makes an appeal to Indra to make the intellect of men sharp as a razor held in the hands of the barber.

It cannot be gainsaid that nothing can be sharper than the steel blade of a razor in modern conception.

8. The word *karmāra* is mentioned several times in the *Ṛigveda. Ṛv.* X, 72, 2 contains the following line:

Brahmaṇaspatiretā saṁ karmāra ivādhamat
devānāṁ pūrvye yuge-sataḥ sadajāyata

It means that the creator fanned the flames, as the *karmāras* (blacksmiths?) do, at the earliest period of the gods, for the purpose of creation.

This passage points to the importance of the *karmāras* who are compared with Brahmā, the Creator. This is strengthened by the reference to the *karmāras* as *manīshiṇaḥ*, meaning ingenious workers of metal or iron, in the *Atharvaveda*, III, 5, 6. The full passage reads as follows:

Ye dhivāno rathakāraḥ karmārā ye manīshiṇaḥ
Upastīn parṇa mahyaṁ tvaṁ sarvān kṛinvabhito janān.

See also *S.B.E.*, Vol. XLII, *Hymns of the Atharvaveda.*

Russel and Hiralal, in the *Tribes and Castes of the Central Provinces of India*, Vol. III, p. 323, write: "In Bengal and Chhota Nagpur the term Kamar is merely occupational, implying a worker in iron and similarly Kammala in the Telugu country is a designation given to the five artisan castes."

Christoph von Fuerer-Haimendorf refers to "a few families of Kamars, aboriginal blacksmiths" amongst the Hill Reddis of Andhra Pradesh, but considers them to be purely an aboriginal people, having nothing to do with the Telugu blacksmiths (See *The Reddis of the Bison-Hills*, pp. 243-244).

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Likewise there is a tribe in Chhatisgarh, Madhya Pradesh, bearing the name Kamārs but they are neither ironsmiths, nor does their tradition point to any ancient association with iron workings. S. C. Dube writes in *The Kamar*, 1951, p. 5: "There is nothing to prove any affinity between the Kamars of Chhatisgarh and the tribes or castes of the same name in the other parts of the country. The Kamar tradition does not give us any clue regarding their original home and the earlier migrations of the tribe. The mythology of the Kamars does not indicate any ancient association of the tribe with iron or smithery". This is a very interesting example indeed of changes that do come about in the life of a tribe to the exclusion of any memory of the original home or profession, for the word Kamar, in its different regional ramifications, has come to be associated with the profession of blacksmith throughout India, and the earliest known tradition of smithery associated with the term goes back to the *Ṛigvedic* times.

9. The reference to smelting and smelter in the *Ṛigveda* are ample, and a few relevant ones are quoted below:

(i) *Ṛv.* II, 24, 7.

Ṛitāvānaḥ pratichakshyānṛitā punarāta ā tasthuḥ kavayaḥ mahaspathiḥ
Te bāhubhyāṁ dhamitamagnimaśmani nakiḥ sho astyaraṇo jahurhi taṁ

This refers to the throwing of stones *(aśmani)* into fire (*agni*) and fanning *(dhamitaṁ)* the flames, using both the hands *(bāhubhyāṁ)*.

Sayanacharya explains the operation in the following words: *Te bāhuhbyāṁ dhamitamagnimaśmani jahuḥ hi dagdhuṁ* i.e. they threw the stones (ores) in the fire (flames) fanned with both the hands.

(ii) *Ṛv.* IV, 2, 17 has been quoted before under reference no. 1 above.

Here the purification of the human life is compared to the purification by smelting of *ayas* practised by the *karmāras* by means of bellows, which were no doubt wielded and worked by both the hands as stated above.

Sayanacharya explains the passage in detail and refers to the use of the bellows for the operation of smelting by fanning the flames.

(iii) *Ṛv.* X, 81, 3 gives further details of the process of smelting:

Viśvataschakshuruta viśvatomukho viśvatobāhuruta viśvataspāt
Saṁbāhubhyām dhamati saṁ patatrairdyāvābhūmī janayandeva ekaḥ

This refers to Viśvakarmā or the Creator of the Universe, who has eyes, face, arms and feet and who created the heaven and earth with his hands and feet even as the *karmāra* who uses his hands and feet in the act of blowing while smelting.

10. M. N. Banerjee, *I.H.Q.*, Vol. V, pp. 432 ff.

Ṛv. IX, 112, 2 reads as follows:

Jaratībhiroshadhībhiḥ parṇebhiḥ śakunānāṁ
Kārmāro aśmabhiḥ dyubhiḥ hiraṇyavantamichchhatīndrāyendro pari srava

Wilson (*Rigveda Translations*, Vol. V, p. 338) translates it thus: "With dried plants (are arrows made), with the feathers of birds, with glistening stones, the smith seeks a man who has gold; flow Indra for Indra."

The throwing of ores into the fire and fanning up the flames to raise the temperature points to the metallurgy of iron, which was not smelted at once, or at low temperatures but was reduced in the beginning to a spongy mass, unlike the ores of copper, which became liquid on heating and had to be collected in a vessel.

11. *Aśmabhiḥ dyubhiḥ*

12. *Parṇebhiḥ śakunānāṁ*

13. The *Ṛigveda* mentions many other equipments besides *asi*, *svadhiti* and *kshura*, which are at once sharp, hard and awe-inspiring and could have been made, in all possible cases, of iron. The weapons and tools referred to in the

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Ṛigveda include *varman, āyudha, ishu, bāṇa, paraśu, dhanus, śalya, śṛiṅga, kulmala, nishaṁga, bhṛishṭi, charu, vāśī, kṛiti, yurṇi, jurṇi, vṛika, pavi, khaḍga, titona, dharma* etc. Of these some are apparently made of iron, from their hardness or sharpness, and these will be dealt with specially, in view of the problem in hand. These comprise, besides, *kshura, asi, svadhiti, paraśu, vāśī* and *pavi.*

Asi, svadhiti and *kshura* have been dealt with earlier (see notes, nos. 5, 6 and 7, respectively).

Paraśu occurs, for instance, in *Ṛv*, VI, 3, 4:

Tigmaṁ chidema mahi varpo asya bhasadaśvo na yamasāna āsā
Vijehamānaḥ paraśurna jihvāṁ dravirna drāvayati dāru dhakshat

It refers to the devastating force of fire (*agni*) which devours (*smelts*) all wood like the *paraśu* (axe), which imposes its own force when employed for the cutting of wood.

Paraśu has always been used in the sense of an axe, with both weight and sharpness to perform its job efficiently.

The general sense of the word *vāśī* is an axe, as the following passages would show:

(i) *Ṛv.* VIII, 19, 23 has the following passage:

Yadī ghṛitebhirāhuto vāśīmagnirbharta uchchāva cha asura iva nirṇijaṁ

It simply means that when clarified butter *(ghṛita)* is offered to fire (*agni*) its sharp (axes of) flames move up and down like that (axe) of the *asura* (demon). The sharpness of the *vāśī* (axe) is thus compared here with that of fire.

(ii) *Ṛv.* VIII, 29, 3 reads as follows:

Vāśimeko bibharti hasta āyasīmantardeveshu nidhruviḥ

It refers to the holding in the hand resorted to by the *devas* (gods) of the axe made of *ayas* (iron?)

Pavi also occurs at several places and a few examples are given below:

(i) *Ṛv.* I, 166, 10 reads as follows:

Bhūrīṇi bhadrā naryeshu bāhushu vakshaḥsu rukmā rabhāsāso añjayaḥ
Aṁseshvetāḥ pavishu kshurā adhi vayo na pakshān vyanu śriyo dhire.

The Maruts, addressed in this passage, are described as armed and equipped with different objects which make for their welfare, and that they hold out treasure, for the supplicants, as Sayancharya explains.

The word *pavi* occurs in this context and is one of the equipments or weapons *(āyudhāni)* of the Maruts. It is at once hard like the *vajra* and sharp like *kshura.*

(ii) *Ṛv.* I, 174, 4 contains the word *pavīrava* as in the passage below.

Śeshan nu ta Indra sasminyonau praśastaye pavīravasya mahnā
Sṛijadarṅāṁsi ava yadyudhā gastishṭhadharī dhṛishatā mṛishṭa vājan

Here the reference is to the weapon *(pavīrava)* equated with *vajra* (thunder) wielded by Indra, which by its greatness puts the enemy to flight.

(iii) *Ṛv.* X, 60, 3 contains again the word *pavīrava* :

Yo janānmahishān ivātitasthau pavīravan utāpavīravān yudhā

This is in praise of the king *Asamāti*, who conquers or overcomes men (people) with or without the *pavi*, which has been taken by Geldner as a weapon of iron and by Sayanacharya as a *khaḍga* (axe).

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Thus it is clear that *pavi* was a powerful weapon as much in the hands of men as of the gods, and, by its hardness and sharpness, it would equate to one of iron rather than of copper.

Pavi has also been used like the *svadhiti* or *paraśu* for the cutting down of woods as exemplified in the following *Ṛigvedic* passage (*Ṛv.* VI, 8, 5):

Yuge yuge vidathyaṁ gṛiṇaḍbhyogne rayiṁ yaśasaṁ dhehi navyasīṁ
Pavyevo rājannaghaśaṁsamajara nīchā ni vṛiśchaḥ vaninaṁ na tejasā

It refers to the extensive cutting down of the forests by means of the *pavi*, which has the hardness of the *vajra* (thunder-bolt) as Sayanacharya explains.

Pavi is also used as the metallic tyre of wheels of chariots, which has the strength to split rocks as stated in the passage quoted below (*Rv.* V, 52, 9):

Uta sma te paruṣhnyāmūrṇā vasata śuṅdhyavaḥ
Uta pavyā rathānāmadriṁ bhindatyojasā.

H. Zimmer, in *Altindisches Leben*, 1879, p. 248, says that the tyres of the wheels were made of metal, and the chariots of the gods had naturally golden tyres. Marut split the rocks apart with *pavis* (tyres of the wheels).

The use of gold to split the rocks is out of the question. So is the case with silver or copper, unless the metal was bronze, which has a greater measure of hardness than the other metals, but to which or to tin, which is the former's essential component, there is no reference in the *Ṛigveda*. The only metal that could achieve the task was inferably iron.

Pavi is employed in the sense of wheels as well, as stated in the following passage (*Ṛv.* I, 34, 2):

Trayaḥ pavayo madhuvāhane rathe somasya venāmanu viśva idviduḥ.

It simply means the occurrence of three wheels in the chariot of the *Aśvins* whose anxious desire for *soma* is known to all.

The following reference to *pavayaḥ* (plural) in *Ṛv.* V, 31, 5, may imply the thunder-bolts or equally efficient weapons which were hurled against the *dasyus*, the enemies of the Aryans:

Anaśvāso ye pavayo rathā indreṣhitā abhyavartanta dasyūn

It means that the *pavis* which Indra sent without the horse and chariot turned against the *dasyus*.

Pavis appear, therefore, to have been employed from the very beginning of the encounter of the Aryans with the *dasyus*.

In this connexion it may be noted that the word *pavi* is derived from a basic Indo-European root which has the sense of striking, sawing or purifying. (see J. Pokorny, *Vergleichendes Woerterbuch der Indo-germanischen Sprachen*, II, Berlin and Leipzig, 1927, p. 12).

In Lithuanian it has the form of *peu*: (*pau*): *pu* and it means 'to strike'. In the same language, *appianti*, which is derived from the same root, means 'to cut' and *puiklas* means a saw.

In Latin the form *pavio* means 'to strike, and clean or cleanse'.

In Old Persian the root '*peu*' means to 'purify' and the form *pavi*, obviously derived from it, means the rim of a wheel and *paviram*—means a weapon with a metallic head or top. (See Uhlenbeck, *Altiranisches Woerterbuch*, p. 160).

The Sanskritic root is *peu* and means to purify or cleanse.

14. See the remarks under note no. 9.

15. Forbes, *Metallurgy in Antiquity*, 1950, p. 437.

16. Macdonell and Keith, *Vedic Index*, I, pp. 31-32; P. Ray, *History of Chemistry in Ancient and Medieval India*, 1956, pp. 36-37.

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Vājasaneyi Saṁhitā, of the *Yajurveda*, 18, 13 mentions the following metals:

'Hiraṇyaṁ ayaḥ śyāmaṁ, lohaṁ, sīsaṁ, trapu'.

Mahīdhara explains *hiraṇyaṁ* as *suvarṇaṁ* (gold) or *rajataṁ* (silver ; *ayas* as *lohaṁ* (copper), *śyāmaṁ* (iron), *tāmraloḥaṁ* (copper), and *kāṁsyaṁ* (bell metal . He further points to *loḥaṁ* (copper) as *kālāyase* (black iron) *sarvataijase* (in all utensils). *Sīsaṁ* (lead) is well known, and so is *trapu* (tin). Thus according to Mahīdhara *'ayas'* stood in the days of the *Yajurveda*, in the post-*Ṛigveda* phase, as a general term for metals, which did include iron. To distinguish the latter further is the use of the term *kālāyas*, which was used alongside copper for making all utensils.

17. Macdonell and Keith, *op. cit.*, I, p. 151; II, pp. 234-5; A. B. Keith, *The Religion and Philosophy of the Vedas*, Harvard Oriental Series, Vol. 31, p. 20; M. Winternitz, *A History of Indian Literature*, I, p. 303.

18. Herodotus, VII, 65; Forbes, *op. cit.*, p. 435.

19. E. H. Warmington, *The Commerce between the Roman Empire and India*, Pt. II, chapter III, pp. 257-8; D. H. Gordon, *Prehistoric Background* etc., p. 55.

20. V. A. Smith, *The Early History of India*, 1924, p. 102; Quintus Curtius, IX, 24.

21. E. F. Schmidt, *The Treasury of Persepolis, Oriental Institute of Chicago, Communications*, No. 21, 1939.

22. Pliny, *Natural History*, 34, 145; Warmington, *op. cit.*, p. 258; Forbes, *op. cit.*, p. 439.

23. Tr. by W. H. Schoff, 1912, p. 24; Warmington, *op. cit.*, p. 257.

24. Warmington, *Ibid.*, p. 258.

25. H. C. Raychaudhuri, *P.H.A.I.*, pp. 8, 10, 277.

26. R. Shamasastry, *Kauṭilya's Arthaśāstra*, 1st Edition, p. 83.

27. *Ibid.*, p. 85-86; *Kauṭilya Arthaśāstra*, Book II, 12, 15.

28. *Ibid.*, p. 86.

29. *Kauṭilīya Arthaśāstra*, has the following passage to indicate the constituents of mines (II, 6, 4):

Suvarṇa-rajata-vajra-maṇi-muktā-pravāla-
śaṅkha, lavaṇa-bhūmiprastara rasa-dhātavaḥ khaniḥ."

For the duties of the Director of Mines see R. P. Kangle, *The Kauṭilīya Arthaśāstra*, Part II, Bombay, 1963, pp. 87, 121.

It may be noted that iron was also known as *kālāyas* in the *Arthaśāstra* (II, 6, 55).

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CHAPTER 7

EVIDENCE OF THE USE OF IRON IN INDIA IN THE EARLY HISTORICAL PERIOD AS REVEALED BY RECENT EXCAVATIONS

(i) *General*

In addition to the evidence on the earliest use of iron in India, there is a good deal of iron reported from various excavated sites, the chronological horizons of which require a thorough re-orientation in the light of the latest concepts of chronology in India. These would in a way corroborate the inference already postulated in this work. They would also indicate, incidentally, the spatial distribution of iron in early times. Among these sites in north India, where iron has been found, only those, which have, however, even vaguely a relevant chronological bearing are being mentioned below.

(ii) *Traces of slags*

Ancient slags[1] of iron are stated to be available in every district in India from the extreme south to the Himalayas and would, no doubt, represent remains of iron workings ranging from the actual profitable undertakings to endeavours of experiment.

(iii) *Taxila*

Sir John Marshall's excavations at Taxila, District Rawalpindi, Pakistan, yielded large numbers of iron objects[2] in dated contexts. The earliest of these, as dated by the excavator, goes back to the 6th and 5th centuries B.C., and at once disproves Gordon's contention. The only iron object from this Period is a short dagger blade. The next period dated to the 4th century B.C., yielded a carpenter's adze, and a straight-edged and convex-backed knife.

The succeeding Mauryan period was quite rich in iron finds among which were represented a bowl, spoons and saucepans with loop handles, double-edged, straight-bladed and tanged daggers, javelins, arrow-heads of different shapes, an elephant goad, a socketed axe with a slightly drooping blade, adzes, a chisel, a knife, a goldsmith's (or silversmith's) tong, smith's anvils, nails, and socketed and plain hoes.

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The iron objects found in the 1944 excavations on the site (Sirkap)[3] conducted by Wheeler were available throughout all levels ranging from the mid-first century B.C., to the second century A.D.

(iv) *Hastinapura*

The earliest evidence of the use and manufacture of iron in Hastinapura has been mentioned already. Among the numerous iron objects[4] found in the succeeding Period (III), dated by the excavator to *circa* 600-200 B.C.[5] occur a barbed and socketed arrow-head (fig. 15) and a chisel, both from the lowest levels of the Period, besides a bracelet with unconnected ends.

(v) *Rupar*

The 1952-55 excavations at Rupar, District Ambala, Panjab, have shown ample occurrence of iron objects in Period III,[6] dated to *circa* 600-200 B.C., from its earliest levels, though no trace of iron objects is found on the site in the earlier levels. The iron objects of Period III comprise nails, hooks, bars, spikes with socket, handles, knives, daggers, sickles and spear-heads.

(vi) *Sisupalgarh*

The 1948-50 excavations at Sisupalgarh near Bhubaneshwar, District Puri, Orissa, have yielded iron objects[7] in Periods IIA and IIB, dated to *circa* 200 B.C. to A.D. 200. In the light of the recent discoveries of the black-and-red ware in the pre-N.B.P. levels at Sonpur[8], in District Gaya, Bihar, and in the whole of west, central and south India as an integral and characteristic element of the chalcolithic culture, tentatively dated to 1500-800 B.C., as well as in the megalithic, dated to 700 B.C. onwards, the above-mentioned time-scale for Sisupalgarh would undergo a revision.

The reason for the ascription of a limited chronological range to Periods I and IIA of Sisupalgarh is to be set down partly to the then limited knowledge of the occurrence of the black-and-red ware which was considered as peculiar to the megalithic culture only, which was then very cautiously dated by Wheeler to *circa* 200 B.C. The table of chronology at Sisupalgarh was, therefore, arrived at on the conservative dating of the then freshly-revealed megalithic culture at Brahmagiri. The date of the megalithic culture has been suggested (pp. 65-7) by the author to commence in *circa* 700 B.C. The question of the black-and-red ware has been discussed at length by B. Subbarao[9]. He has endeavoured to prove a commonness of origin of this ware dating back to about 1000 B.C., and possibly earlier still in the chalcolithic

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facies of west, central and south India, with developmental tendencies in later times to the elongation of the shapes leading to pointed bases, requiring ring-stands for support. The shapes at Bahal and Tekwada offer the nearest parallels in commonness of shapes between the chalcolithic ware and the corresponding megalithic ware of Brahmagiri and elsewhere. Subbarao has shown that likeness in fabric, shape or form, decorative motifs or patterns, where they exist, not to speak of identity of technique, can generally be traced between the two cultural groups.

The black-and-red ware sherds of Sisupalgarh were found to bear "resemblance in fabric, texture and shape to the megalithic ware of south India"[10].

The recent excavations at a burial site of the chalcolithic folk at Tekwada[11], on the Girna, a tributary of the Godavari, in District East Khandesh, Maharashtra, have shown apparent likeness in shape, fabric and even the scratched graffiti marks between the chalcolithic black-and-red ware, of earlier date, and the megalithic ware, of a later date. It has also been considered that the earliest or lowest occurrence of the black-and-red ware at Sisupalgarh is about 10 ft. (3.05 m.) below the lowest sherd of the Rouletted Ware, dated to *circa* 50 A.D. As many as 11 successive layers separate the two. Though no thumb-rule can indeed be applied to the calculation of the time-scale for the formation of strata, the possibility, in the context of a proved lower horizon of the black-and-red ware, of an earlier date at Sisupalgarh strongly entrenches itself. This would also give rise to a correspondingly earlier date for iron on the site.

(vii) *Nasik*

The excavations at Nasik, District Nasik, Maharashtra, have yielded large numbers of iron objects[12], nearly 90% of which were recovered from the Period II of habitation on the site. This period has been subdivided into Periods IIA and IIB, respectively[13]. Period IIA, which is the earlier of the two, has been assigned the chronological range of *circa* 400-200 B.C. on the basis of finds of the N.B.P. Ware and silver punch-marked coins. It is apparent that this orthodox time-scale has been influenced to an extent by the associated black-and-red ware ceramic, of megalithic affinity. In the light of what has been stated already about the origin and affiliation of the black-and-red ware, the date-scheme needs a change. Further, the protohistoric chalcolithic culture in the upper levels of Maheshwar and Navdatoli has been found to overlap[14] with the early historical period, though at Nasik there was a period of desertion[15] between the two before the subsequent habitation began there in a corresponding

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habitation period. The protohistoric chalcolithic cultures have been dated on the basis of C.-14 tests[16] to *circa* 1800-1000 B.C. In the light of these facts a corresponding lowering of the time-scale at Nasik is clearly indicated (see also Chapter 13).

The iron objects[17] from Period IIA comprise among others, leaf-shaped arrow-heads, caltrops, choppers, concavo-convex knife-blades, tang fragments, axes, drills, chisels of circular cross-section, lamp or ladle, rings and nails suggesting a wide variety of uses. These further imply a fairly long period of evolutionary development pushing the beginnings of the industry further backward chronologically.

(viii) *Maheshwar and Navdatoli*

The recent discovery of iron objects[18], in Period IV of Maheshwar and Navdatoli, District Nimar, Madhya Pradesh, dated to *circa* 400-100 B.C., agreeing in form with those from Taxila, with the exception of the shaft-hole axe, is another evidence against the view of Gordon.

(ix) *Tripuri*

Tripuri in District Jabalpur, Madhya Pradesh, has yielded iron objects[19] in all strata except the protohistoric chalcolithic levels. The earliest of these iron-bearing strata or Period II, is dated to *circa* 400-300 B.C. In view of the apparent overlap of the chalcolithic culture with the beginnings of the early historical period in general, an earlier date-range than conceded hitherto for Period II, coeval with the use of iron, is called for.

(x) *Nagda*

The evidence from Nagda[20] has been partially discussed earlier (p. 7, *ante*). Period III (*circa* 500-200 B.C.) has yielded 131 objects in all. They include knives, daggers, chisels, sickles with curved blades, arrow-heads of square, rectangular and hexagonal cross-sections, occasionally with tangs, double-edged daggers, hoes, chisels, a *khaḍga*-shaped knife, nails and bowls. All these reflect the well-settled nature of iron in this Period and the many-sidedness of its use.

(xi) *Prakash*

The evidence of Prakash,[21] District West Khandesh, Maharashtra, corroborates the evidence at Nagda, and takes the date of iron backwards from the datum of the N.B.P. Ware, as stated earlier (p. 11). A full-fledged iron-using culture has been found here associated with the black-and-red ware pottery in a deposit 14-15 ft. (427-457 cm.) thick, underlying the deposit associated

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with the N.B.P. Ware. The pre-N.B.P. Ware iron-using culture emerged on the site subsequent to the protohistoric chalcolithic culture, and was separated from it by an intervening accumulation of gravel. In all 25 objects of iron have been recovered from the pre-N.B.P. Ware and 5 from the N.B.P. Ware deposits. In this connexion it would be worthwhile to mention that the chalcolithic culture at Prakash has been tentatively shown to be an outlier within the Malwa group of chalcolithic sites, which includes Maheshwar-Navdatoli, with considerable common ground[22], and this might call for a slightly later date for the N.B.P. Ware at Prakash.

(xii) *Bahal*

The excavations at Bahal[23], District East Khandesh, Maharashtra, have yielded iron objects comprising spear-heads, knives, daggers and sickles. All these have occurred in Period II, dated to *circa* 600-300 B.C.

(xiii) *Sonpur*

The excavations at Sonpur[24], District Gaya, Bihar, have shown the occurrence of iron in Period III, characterized by the N.B.P. Ware and dated, accordingly, to the 6th century B.C. The objects comprise nails and blades, etc.

(xiv) *Purana Qila, New Delhi*

The excavations at Purana Qila[25], New Delhi, considered to be the site of Indraprastha, of the days of the *Mahabharata*, revealed the evidence of the use of iron in association with the N.B.P. Ware, dating back to the 6th century B.C. It may be recalled incidentally that the site has yielded the Painted Grey Ware in its earliest levels.

(xv) *Jaugada*

A full-fledged iron-using culture has been found in the post-neolithic, early historical, period (I) at Jaugada[26], District Ganjam, Orissa. It is also associated with the black-and-red ware as at Sisupalgarh and would possibly belong to a pre-Mauryan level and to a date comparable with that of the megalithic culture.

(xvi) *Rajgir*

The recent excavations[27] at Rajgir, District Patna, Bihar, have also yielded a few iron objects, apparently associated with the N.B.P. Ware and should likewise be dated, on the showing of Hastinapura and Kausambi, among other sites, to the beginning of the 6th century B.C. Its upper limit extends upto *circa* 200 B.C.[28]

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Even the results of the latest excavations sustain the views expressed above.

In this context it would not be out of place to enumerate a few sites where iron has been found as a result of excavations, but where the chronological conclusions, would largely require to be revised in the light of recent discoveries. A few such sites are mentioned below with such relevant details as are available.

(xvii) *Nagari*

Iron objects comprising arrow-heads and nails were found in the occupational deposits of the Mahādeva temple mound at Nagari[29], near Chittorgarh, District Udaipur, in Rajasthan. The earliest occupation of the site was estimated to go back to the 3rd century B.C.

(xviii) *Sambhar*

Iron objects comprising hatchets, a cobbler's scraper or chisel, mouth-pieces of a blacksmith's bellows, double-edged daggers with long tangs, sickles, crucibles, chisels, clasps or staples, fish-plates, braces, rings, articles for strengthening door leaves, door pivots, a stirrup, bells, ladles, spoons, a large cylindrical vessel, arrow-heads and spear-heads were found at Sambhar[30], District Jaipur, Rajasthan. The occupation on the site was assessed to go back to the 3rd century B.C.

(xix) *Rairh*

A large number of iron objects was found at Rairh[31], District Jaipur, Rajasthan, in the 1938-40 excavations on the site. According to the estimate of the excavator the oldest habitation on the site goes back to the 3rd century B.C. It is likely that this date would undergo revision with a leaning towards an earlier dating. The iron objects include sword blades, lances and spear-heads, small daggers, knives, arrow-heads, sickles, axes, adzes, nails, door fittings and fragments of door chains.

(xx) *Bairat*

The excavations at Bairat[32], District Jaipur, Rajasthan, have also yielded some quantities of iron objects in dated contexts. The monastery on the site seems to have existed at a time when silver punch-marked coins were in vogue, and lived through the Greek periods to the middle of the 1st century A.D. The iron objects found in the monks' cells consisted largely of nails. The circular temple[33], discovered on the site, was built in the Asokan period and the iron objects in and around the temple comprised

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iron clamps, nails of different sizes, fishplates, possibly for use on wooden pillars or doors, and an iron chisel.

More recently the site was re-excavated by the author in 1962 and objects of iron together with quantities of slag of iron, were found associated with the material remains of the earliest period of occupation on the site, distinguished by its association with the Painted Grey Ware. The subsequent period, characterized by the N.B.P. Ware, followed with an overlap, and, of course, contained objects of iron, conforming to the general pattern of the evidence throughout the country[34].

NOTES AND REFERENCES

1. J. C. Brown and A. K. Dey, *India's Mineral Wealth*, 1955, p. 176.
2. John Marshall, *Taxila*, Vol. II, pp. 68ff.
3. A. Ghosh, Taxila (Sirkap) 1944-45, *A.I.*, no. 4, pp. 45, 78, 79, pls. XVIII B, & XIX.
4. B. B. Lal, Exacavations at Hastinapura and other Explorations etc., *A.I.*, nos. 10 & 11, pp. 97-98.
5. *Ibid.*, p. 23.
6. Information from Dr. Y. D. Sharma; *I.A.*, 1953-54, pp. 6-7; 1954-55, p. 9; Y. D. Sharma, Exploration of Historical Sites, *A.I.*, no. 9, pp. 123-125; Past patterns in living as unfolded by excavations at Rupar, *Lalit Kala*, nos, 1 & 2, 1956, p. 125.
7. B. B. Lal, Sisupalgarh 1948: An early historical fort in Eastern India, *A.I.*, no. 5, 1949, p. 78.
8. *I.A.*, 1956-57, p. 18.
9. B. Subbarao, *Personality of India*, 2nd edition, 1958, pp. 173ff.
10. Lal, *op. cit.*, p. 78.
11. *I.A.*, 1956-57, pp. 18-19.
12. H. D. Sankalia and S. B. Deo, *Report on the Excavations at Nasik and Jorwe*, 1950-51, Poona, 1955, pp. 109-116.
13. *Ibid.*, pp. 28-29.
14. H. D. Sankalia, B. Subbarao and S. B. Deo, *The Excavations at Maheshwar and Navdatoli*, 1952, Poona-Baroda, 1958, p. 28.
15. Sankalia and Deo, *op. cit.*, p. 109-116.
16. Sankalia, Subbarao and Deo, *op. cit.*, addendum between pages xii and xiii; see also B. B. Lal, A picture emerges: an assessment of the Carbon-14 datings of the protohistoric cultures of the Indo-Pakistan sub-continent, *A.I.*, no. 18, pp. 208. The up-to-date Carbon-14 results from the Chalcolithic sites take the date back to 2035±75 B.C. at the earliest (Ahar) and to 670±120 B.C. at the latest. While the upper date corresponds with the date-scheme proposed by the author, the earlier date recedes further backwards. In view of the defects attendant on the studies of Carbon-14 the writer is inclined to wait until firm date-schemes are fixed on absolutely unassailable grounds.
17. Sankalia and Deo, *op. cit.*, pp. 109-116.
18. Sankalia, Subbarao and Deo, *op. cit.*, pp. 22 & 211.
19. M. G. Dikshit, *Tripuri*, 1952, pp. 13 & 101.
20. The details have been furnished by the present author in the report on the Ñagda excavations awaiting publication.

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21. *I.A.*, 1955-56, p. 13.
22. Sankalia, Subbarao and Deo, *op. cit.*, pp. 245-246.
23. *I.A.*, 1956-57, p. 18.
24. *Ibid.*, p. 19.
25. *I.A.*, 1954-55, p. 14.
26. *I.A.*, 1956-57, p. 15.
27. *I.A.*, 1954-55, p. 16.
28. Lal, *op. cit.*, p. 23; A. Ghosh, Rajgir 1950, *A.I.*, no. 7, pp. 70-71.
29. D. R. Bhandarkar, *The Archaeological Remains and Excavations at Nagari, M.A.S.I.*, no. 4, pp. 144-145.
30. D. R. Sahni, *Archaeological Remains and Excavations at Sambhar*, p. 49, pl. XIV.
31. K. N. Puri, *Excavations at Rairh*, pp. 35-36, pls. XIX-XX.
32. D. R. Sahni, *Archaeological Remains and Excavations at Bairat*, pp. 21-27.
33. *Ibid.*, pp. 31-32.
34. *I.A.*, 1962-63, Section I (unpublished).

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CHAPTER 8

NATURE OF THE EARLY IRON INDUSTRY AS DOCUMENTED AT UJJAIN

The discovery of the evidence of smelting and manufacture of iron objects at Ujjain has been mentioned already. It will be worthwhile to consider at this stage the details of the industry, not merely because of the importance of the discovery but also of its unique features. The industry at Ujjain was centrally located, within the bounds of the fortifications alongside the western area and was practised extensively during Periods II and III. Considering the fact that the fortifications served as a citadel and the iron objects found in the excavations, by and large, were mostly weapons of war, this location[1] is easily understandable.

The evidence of smelting is provided by enormous deposits of iron slag, unsmelted or partially smolten iron ore, lumps of a crystalline material identified as calcite or aragonite, and quantities of a whitish powder, presumably lime, the result of smelting in close association in the fillings of a canal or channel of Period II. This evidence ranges in date from a later phase of Period II (500-200 B.C.) to an early phase of Period III (200 B.C. onwards). These deposits have a tendency to lie on the sides rather than in the middle of the canal.

The use of calcium compounds as a flux in the smelting of iron is well known. In this context, the co-occurrence of calcite or aragonite with iron slag is easily explained. The whitish powder, referred to above, would, in all probability, represent the calcium compound resulting from the smelting operation. The juxtaposition of the canal is also significant. The waters in the canal were possibly used for the iron industry. It will not be out of place, therefore, to describe the canal as an integral part of the industry at Ujjain. It is easy to guess, in the light of this evidence, that considerable importance was attached to the industry as it supplied the sinews of warfare, and accordingly elaborate arrangements were made for the success of the undertakings.

As regards the actual mode of smelting, the evidence is not clear, though certain broad inferences are possible. Alternate deposits of charcoal mixed with the iron slag and a whitish

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powder, possibly lime, as stated above, occurring in an exposed section point to a simple method of smelting employed at Ujjain. The *modus operandi* consisted, inferably, in laying several alternate courses of charcoal and iron ore and covering the entire pile thickly with clay to prevent the heat from escaping. The sides of this heaped and simple kiln, which should have been circular in plan, must also have been provided with passages for the intake of air and escape of gases, and outlets for molten iron. The molten liquid, after collection, was, no doubt, first cooled by dipping into water and then beaten with hammer to drive out the charcoal, which, in the course of the hammering went into the (reduced) iron, giving it, to an extent, the properties of steel, and thus eliminating the slag[2].

While the evidence at Ujjain on the process of smelting is inconclusive as to the actual methods employed, it is, nevertheless, clear that charcoal was used as fuel, the hearths were of the 'open' type, and the iron smelters had reached the technical advancement requiring the use of a calcium flux to aid them in smelting. Such a stage of development would itself be the result of prolonged experimentation involving much trial and error, and would indicate a still earlier beginning for the iron working in the area, which quite fits in with the evidence. The primitive form of the kiln in combination with the evidence of a flux would perhaps suggest a local development.

As regards the method of forging adopted in the period range of *circa* 500-200 B.C., the remains of a forge[3] (pl. III) with a groove for the introduction of the working end (or nozzle) of a blower or bellows, an improvised stand made from the sturdy and large neck of a broken vessel to support a water jar to store water for quenching, a small or miniature jar to collect small quantities of water according to necessity, and a shallow but large enough bowl to contain water near at hand for quenching help to reconstruct the process of a blacksmith's working. The use of an anvil, also of iron, and iron tools like pincers for handling the red-hot iron bar or tool, is clearly indicated. The iron nail and chisel lying near the forge, which is lined with bricks and clay, burnt hard, and contains ash and charcoal, suggest the variety of objects produced, sharpened or remade at the forge. This method is even now in vogue, and would by itself indicate an advanced stage of development of the process of iron working, with a long background.

That the iron workers of Ujjain, also called Avanti, had set up a tradition early enough and achieved renown far and wide, including the distant Tamil country in the south, is testified by the pointed references to them in the Tamil works, *Maṇimekalai*[4]

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and *Peruṅgadai*[5] of the early centuries of the Christian era. In one context they are described along with different categories of artisans, who were obviously employed for the construction of the golden pavilion of the Chola king, Kiḷḷi Vaḷavan. The passages under consideration would suggest that they were surely among the best workers of iron in the country, otherwise they would not be called upon to travel to the far south and work alongside the specialists in different crafts employed on the works. These references cannot be without significance as to the existence of an iron industry at Ujjain in early times. A trade by virtue of its initial advantages displays a tendency to get localized and the high technical skill that is achieved in course of time is disseminated from this centre. Such a phenomenon must have developed in Ujjain from the earliest days of the manufacture of iron objects in the area. This itself would suggest the early beginnings of the industry at Ujjain.

K. R. Srinivasan[6] writes as follows: "*Maṇimekalai* (XIX, ll. 107-9) and *Peruṅgadai* (I, II, 40-44) though later than our period, aptly summarize this development. The former says in one context (XIX, 107-9) that 'the artisans from Magadha, the metal workers from Marāṭṭa, the blacksmiths from Avanti, and the Yavana carpenters all worked in unison with the artisans of the Tamil country'. The passage reads as follows:—

'Magadha viṇaiñarum, Marāṭṭa-k-kammarum, Avanti-k-kollarum Yavana-t-tachcharum, taṇ Tamiḷ viṇaiñar-tammoḍu kūdi-k-koṇḍu-inidu-iyaṟṟia'.

It may be observed here that the words employed for the iron workers of Ujjain (Avanti) are *Avanti-k-kollarum.*

Srinivasan continues, "The latter (I, II, 40-44) is a little more elaborate: 'Yavana carpenters, the blacksmiths of Avanti, the jewellers (or expert artisans) born in Magadha, the workers on fine gold born in Patali (Pataliputra), the artists (painters and modellers) who flourished in Kosala and the metalsmiths of the Vatsa country."

The passage runs as follows:—

Yavana-t-tachcharum Avanti-k-kollarum
Magadattu-p-piṟanda paśum poṇ viṇaiñarum
Kosalattu-iyaṟṟia ōbiya-t-toḷilarum
Vaṭṭa nāṭṭu vaṇṇa-k-kammarum

The words *Magadattu-p-piṟanda maṇi viṇaiñarum* also means lapidary and bead work craftsmen.

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NOTES AND REFERENCES

1. *Kauṭilya's Arthaśāstra*, translated by R. Shamasastry, 4th edition, 1951, p. 54, under the Chapter entitled "Buildings within the Fort", has the following passage: "To the West artisans manufacturing worsted threads, cotton threads, bamboo mats, skins, armour, weapons and gloves, as well as the people of the Sudra caste shall have their dwellings."

Though the remains of the smelting operations at Ujjain are located nearer the western side than the eastern, they are yet within the southern sector; and large numbers of finished and unfinished objects of iron have indeed been found in the workshops for the manufacture of stone beads, bone arrow-heads and, presumably, also of iron objects, located towards the southern side.

2. This conforms to one of the methods of smelting described by Forbes in the Chapter on "Extracting, Smelting and Alloying", in the *History of Technology*, Vol. I, p. 593, fig. 388.

3. *I.A.*, 1957-58, p. 3, pl. XLI B.

4. *Maṇimekalai* is a post-Sangam work of the 7th-8th centuries A.D.

5. *Peruṅgadai* of Kongu-velir is based on the Sanskrit *Bṛihatkathā* of Guṇāḍhya, and was composed in the early centuries of the Christian era.

6. K. R. Srinivasan, in the Chapter on Art and Architecture of South India in *A Comprehensive History of India*, Vol. II, *The Mauryas and Satavahanas*, 325 B.C.-A.D. 300, 1957, p. 724.

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CHAPTER 9

SMELTING PRACTICE OF PRIMITIVE TRIBES IN CONTEMPORARY INDIA AS AN INDEX OF THE EARLY METHODS OF IRON WORKINGS IN INDIA

The methods of smelting and working iron practised till to-day by a primitive tribe of Madhya Pradesh, called the Agarias, and several others in Bihar or Maharashtra may approximate to or suggest the methods of smelting and forging adopted by iron workers in ancient times of which there is no written record, especially, since the scanty archaeological evidence at the moment leaves the inference so tentative or inconclusive. These methods would, therefore, supplement the archaeological evidence and form the basis for further research.

The iron workings of the tribals[1] who comprise the Agarias and Khuntia Chokhs of Madhya Pradesh with a concentration in the Mandla district, Marias and Murias of Bastar, in Madhya Pradesh, Mahali Asurs of Bilaspur, Birs, Birjhia and Agaria Asurs of Palamau and Ranchi, in Bihar; Gonds, Telis and Mannewars of District Chanda, Maharashtra, divide themselves into the twin operations of (a) smelting and (b) forging. The smithy which consists of the furnace for smelting ores and the forge for working iron objects, is usually located outside the village under a tree or in an unwalled but roofed hut. The operations are carried on mostly by night. Barring minor variations, the furnaces conform largely to the pattern of a vertical or, alternatively, a slightly tilted cylindrical shaft, made of clay, about 3 ft. (91 cm.) high and 3-8 ft. (91-244 cm.) wide. The shaft tapers to the top and has three openings, a large one at the top, and two, one large and the other small, at the base. The opening at the top is for the introduction of charcoal and iron ores. Often a bamboo platform, called the '*machān*' resting on poles and plastered with clay is erected in a level with the top of the furnace. This platform is also provided with 3 in. (7.62 cm.) high dwarf walls as protective parapets, and is sloped towards the opening of the furnace for sliding into it charcoal and iron ore thus acting as an open hopper. The openings at the bottom are for maintaining the blast and for receiving the bloom and slag respectively. The

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aperture for receiving the bloom is significantly called the '*hagān*' or '*lohā hagorā*' (aperture for excretion). The wrought iron obtained by hammering the bloom is in the form of lumps or cakes. Bellows are employed for maintaining the flow of air to keep the furnace alive.

Besides the Agarias and other tribes mentioned above, several other people[2] in different parts of India are engaged in the operation of smelting of iron, as much for profit as for utility, in modern times.

The Agarias do not use any flux, but the smelters in the Waziri hills submit ores first through a process of roasting, to eliminate traces of sulphur and other volatile components, and then smelt them in small furnaces along with a limestone in the form of coral reefs as a flux.

Iron is also smelted on small scales in simple hearths in the Khasia hills in Assam.

In Kathiawar the furnaces employed for smelting iron are rectangular in cross-section and are oblong on plan.

In Manipur, Assam, the method in vogue in the preceding century marked a half-way house between the open fire smelting and the blast furnace. The furnace was a small truncated cone about 18 in. (46 cm.) high with a slightly wider diameter.

The tuyeres were introduced at the sides, and opposite to them was a 9 in. × 9 in. (23 × 23 cm.) opening for the extraction of bloom and slag. The charcoal and iron ore were introduced via the chimney.

The method of smelting in the last century in the Kangra valley seems to have marked an improvement or sophistication over the primitive methods. The furnace here consisted of a slender upright cylindrical shaft of oval cross-section made of clay resting on a high mud-platform. The tuyeres were introduced at the bottom and through them bellows were worked to maintain the flow of air. The bottom of the furnace had a perforated slab through which the slag passed out and was collected in a pit below specially excavated for the purpose. No flux was used for smelting the ores. The bloom was beaten with a wooden hammer upon a granite anvil.

No furnace other than the barest indications of one at Ujjain described above (see page 179), has been forthcoming in the excavations, yet the acquaintance with these indigenous methods would perhaps help to identify even fragmentary remains of furnaces in the excavations.

Walter Ruben[3] has dealt with the topic of the Asuras of literature and legend *vis-a-vis* the Asurs, a modern tribe which constitutes an exclusively iron-smelting folk in central India.

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He makes a basic distinction between the two by spelling the former as Asura and the latter simply as Āsur. According to him Asuras were evil spirits, to be found in the youngest strata of Indian mythology and identifiable with such figures as Māra, the tempter, against whom the Buddha himself had to contend. In this context the Āsurs, who dwelt on the Ganga plains and spoke a Munda language before the arrival of the Aryans, were looked upon with suspicion by the neighbours, being also ironsmiths.

The Asuras assumed gradually the position of totem ancestors and gods of these folks and, as such, they were potent sources of danger to the matriarchal peasantry of the Ganga plains on the one side and to the Aryan settlers of the region in later times on the other.

This is, no doubt, a simplification of the problem, though the question of the ultimate fate of the Asuras of Indian mythology can scarcely be said to have been answered. The problem of the identification of the ancient sites with the ancient remains of the present day Āsurs is, no doubt, fraught with difficulty though a reasonable reconciliation between the cultural assemblages of the ancient sites with the present day cultural repertoire of the Āsurs would be a fair tentative basis for the attempted equation.

According to Ruben, the few modern villages of the Āsurs lie amid the hills called Pahar-Barwe in the neighbourhood of Ranchi, in Bihar, representing the extreme limits of the wanderings of the tribe under the pressure of their struggle for existence. The scale of production of iron by these people is now much smaller than before in view apparently of the competition from cheaper products of the factories, though the industry is not altogether extinct yet, and continues to be their principal occupation.

In earlier times the Āsurs lived in the valleys. The hills in the neighbourhood provided the iron ores, the principal wherewithal of their occupation. Potsherds lying everywhere on the inner slopes of the surrounding hills point to the ancient settlements. Remains of bunded-up tank sites, ruins of bricks and megalithic graves are attributed to this day to the Āsurs. These, especially the tanks called 'Asur pokrā', are associated with slags and bits of rusted objects of iron. The brick-ruins are called either 'Asurgarh' or 'Asurdipa'. Furthermore, stone artefacts, objects of copper and bronze and coins etc. found among them have been attributed to the Āsurs. It may, however, be pointed out that neither do the objects exposed on the ancient site represent a

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unified culture of one particular period nor can their suggested association with the Āsurs be held as proved or correct.

Copper or bronze objects do occur on the sites, but they are mostly surface finds and cannot be connected with the iron-using Āsurs of today. Nowadays, they do not burn bricks, nor build bunded tanks nor even make any stone beads, though the latter occur plentifully in the ancient graves. There is no apparent connexion between the microliths found in the region and the Āsurs either.

The present-day Āsurs live in primitive conditions, and there is practically nothing in their tradition except their dwindling industry in iron to remind the present generation of the technological advance which iron had implied in the earliest days of its discovery and use.

Such a retrogression, as the Āsurs represent in contrast to-day, would further discourage and disclaim any attempted equation between them on the one hand and the ancient iron-using dwellers of the region on the other. Iron was apparently known anciently in the area, but the antiquity of iron in India can hardly be traced to this ancient source for the simple reason that the earliest discoverers of iron would surely have been able to disperse their cultural traits, if any, over a widely expansive area by virtue of the superior fighting equipment which it made possible to build up. But the cultural unity which came into existence anciently and is the connecting link amidst the Indian people till to-day, notwithstanding the small barriers of language, came in the wake of the Aryans who synthesised the achievements of their forerunners and evolved a common pattern of life which reached far and wide, except perhaps the impenetrable mountain fastnesses and the tribal *enclaves*, where primitivism reigns supreme. Even the deliberate proselytizing activities of the medieval and post-medieval times, and more recently of the Church, with the active backing of the State, have scarcely been able to reach the tribal areas with any appreciable degree of success. The difficulties of imposing any cultural conquest over these people in the times with which this treatise deals can well be appreciated. If any connexion is sought to be established between the primitive Āsurs of to-day with any identifiable ancestor, conditions of still greater primitivism have normally to be conceded for them. Such people can scarcely be expected to impart any cultural trait or concede a technological point in favour of any people unless the latter are comparatively still less advanced (see also Chapter 13).

Even if it is possible for the superior numbers of a invading folk to wrest from their numerically circumscribed adversaries

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a point of technological achievement unknown to the invaders, the assumption, as is often made, that the Aryans acquired the knowledge of the manufacture and use of iron objects from the primitive iron-smiths in India, cannot yet be proved archaeologically, nor sustained in the light of other evidences in hand.

Apart from the pointed references to the manufacture of iron in India by the tribals and other small-scale iron smelters, upto a recent past, it may be generally stated that the smelting of iron in India was more widespread than has been generally appreciated. To quote M. S. Krishnan: "That iron making was practised all over the country is attested by the fact that there is scarcely a district outside the great Indo-Gangetic alluvial plains where ancient slag-heaps are not found. The indigenous industry must have been once flourishing wherever there was ore and plenty of forests to supply the necessary charcoal for iron making. ....The iron makers used to get their ore from almost any source in the vicinity."[4] In this connexion, the views of V. Ball on the prevailing methods of smelting are significant. He writes: "The rude smelting-furnaces of the natives ... are probably, to a great extent, the lineal descendants of a system of iron manufacture, which, in the earliest times of which we have any record, must have been on a scale of considerable magnitude."[5]

In the indigenous processes[6] of smelting iron usually ores rich in contents of metallic iron were employed. No flux was used. This is rather unusual in view of the knowledge of the benefits of a flux as prevailed in ancient Ujjain. The furnaces were of three kinds, the first of which was employed in the Deccan and parts of Madras, the second and the third in north India and U. P. In all the cases bellows of the hair of goat or sheep skin were employed to ensure the blast of air into the furnace.

The furnaces in use in south India were circular on plan and conical in shape, broader at the base than at the top. They were from 2 to 4 ft. (61 to 122 cm.) tall, about 10 to 15 in. (25 to 38 cm.) across at the base and 6 to 10 in. (15.25 to 25 cm.) at the top. There were two openings at the bottom; one for letting in the blast and the other for extracting the slag. The fuel of charcoal and iron ores were introduced from the top.

The furnaces of the second type, found in the old Central Provinces (now included in Madhya Pradesh) were cylindrical in shape about 2 ft. 6 in. (76.20 cm.) tall and 15 to 18 in. (38 to 45 cm.) in diameter. The spongy mass of bloom of iron was removed from the top.

The furnaces of the third type were the tallest of the series, being 8 to 10 ft. (244 to 304 cm.) in height but square on plan,

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being about 1 ft. 6 in. (45.75 cm.) across, with a high perforated platform at the base. Its front wall was damaged after every complex of operations and re-built. The metals thus produced was a spongy mass called the bloom that had to be hammered to eliminate the slag.

The iron produced in the indigenous furnaces was wrought iron, because of the lower absorption of carbon in the low temperature achieved in the furnaces and this process enabled easy transformation of the wrought iron into steel.

Steel was produced in India by two processes, namely, (i) carburization of wrought iron, known as wootz steel, and, (ii) decarburization of cast iron.

Wootz is a misnomer for *ukku* which means steel in the Kannada language, but has come to stay. The process involves the filling of small clay crucibles with pieces of wrought iron and 4 to 5% by weight of a good firewood. The crucibles measured 5 in. (12.70 cm.) in length and 3 in. (7.62 cm.) in diameter. After several such crucibles are filled and sealed with clay, they are placed upside down, vertically into a pit 3 ft. 6 in. (107 cm.) deep and 1 ft. 6 in. (45 cm.) wide, which itself is filled with fuel. A blast is then introduced into this pit. The molten liquid obtained is gradually cooled, when it solidifies and, by its absorption of an adequate proportion of carbon, acquires the property of steel.

This process was specially popular in south India and particularly in the Districts of Salem and Tiruchirappalli (formerly spelt Trichinopoly) in Madras, besides the Hyderabad area, in Andhra Pradesh (formerly Nizam's dominions) and Mysore. The megalith-builders may have employed the same method of smelting ores.

In the other process bits of iron, highly impregnated with carbon, in the course of production of wrought iron, are first pounded in a stone mortar to remove the slag and are once again heated in a shallow pit-oven provided with an arrangement for a blast over a charcoal fire. The possibility of a country-wide manufacture of iron existing from quite early times is also indicated by the references to the working of iron mines in Bajuha, Subah Bengal, in Keroh, Subah Kashmir, in Kumaon, Subah Delhi, besides at Nirmal and Indore in *Ain-i-Akbari*[7].

NOTES AND REFERENCES

1. The subject has been dealt with in detail by Verrier Elwin in *The Agarias*, pp. 177ff. and F. K. Leuva in *The Asurs*, 1962.
2. Elwin, *op. cit.*, pp. 216-221.

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3. W. Ruben, *Eisenschmiede und Daemonen in Indien, Internationales Archiv fuer Ethnographie*, I, Vol. XXXVII, *Supplement*, 1939.

4. M. S. Krishnan, *Bull. Geol. Surv. Ind.*, no. 9, 1954, p. 68.

5. V. Ball, *Geology of India*, Part III, p. 340.

6. M. S. Krishnan, *op. cit.*, 1954, pp. 68ff.; P. Neogy, Iron in Ancient India, *Bulletin No. 12 of the Indian Association for the Cultivation of Sciences*, Calcutta, 1914, p. 60.

7. P. Neogy, *op. cit.*, p. 59.

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CHAPTER 10

DISTRIBUTION OF IRON ORES IN INDIA IN ITS BEARING ON THE DEVELOPMENT OF THE IRON INDUSTRY IN ANCIENT INDIA

The distribution of iron ores in India (fig. 17) has indeed a bearing on the mining and smelting operations at different times and indicates the possible geographical extent of the areas where the industry could have developed at an early date. All the ores are not uniformly workable or commercially profitable. To-day hardly any ore that contains less than 50% of iron is considered suitable for commercial use. In the initial stages, however, such consideration would not have decided the course of early endeavours, though experience would have led to the localization of industries in the neighbourhood of rich ores, where also charcoal was available in its raw form of the forests as mentioned before.

Though the principal minerals of iron comprise magnetite, haematite, turgite, geothite, limonite, siderite, pyrite, pyrrholite, ilmenite, greenalite and chemosite, the Indian ores are broadly divisible into three classes, or groups[1].

The first group consists of the ferruginous formations of the Pre-Cambrian Age, which in the unmetamorphosed state comprise haematite-jaspers and in the metamorphosed state are in the form of magnetite-quartz.

The second group includes the sedimentary iron ores of siderite or limonitic composition, occurring in Bengal, Bihar and parts of the Himalayas and Assam.

The third group represents the lateritic ores found almost all over India. These are the sub-aerial modification of gneiss, schists and lavas, under humid tropical conditions. These occur in the Deccan, Western Ghats and many other places. Because of their low (25 to 35%) content of iron, these ores are not yet commercially exploitable.

Though the richest deposits of iron ores in India occur in Bihar, Madhya Pradesh, Orissa, Maharashtra, Mysore and Madras, there are some ores also in such outlying areas in the north as Kashmir, Patiala (Panjab), Mandi (Himachal Pradesh), Kumaon Hills (Uttar Pradesh) and Assam. The ores of Kashmir are not

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considered important. The ores of Patiala, occurring in the Narnaul District, comprise both haematite and magnetite. The Mandi ores are contained in the magnetite-quartzes. The Kumaon ores include both limonite and haematite. There are both magnetite and limonite in the Jaintia Hills of Upper Assam.

The deposits in Patiala and Mandi are, however, included among the more important ores in India, which should have played an important rôle in the development of the iron industry in the region.

There are quite a few mines in Rajasthan as well, which have been worked at various times, and the ores were smelted in the indigenous furnaces, as at Rajgadh in District Alwar.

It is, therefore, clear that the deposits near Narnaul in Patiala and in Mandi mark the northernmost major deposits known in India. It is not unlikely, however, that more deposits in the hitherto unexamined or inadequately explored areas would change the complex of the metallurgical advancement of India, besides strengthening the possibilities of still earlier workings of iron, if any, in ancient India. On the present showing, however, it can be hazarded that it would have been scarcely possible for the Aryan settlers of India to start the manufacture of iron objects, until not only had they reached the area but discovered the rich deposits of the ores of Narnaul. One means of relating the industries to the nearest sources of ores would indeed be to analyze the objects and ores spectrographically[2] in a comprehensive manner so that a connexion, if any, may be established between the finished products and the ores. This task, alas, has not made much progress in India!

The rich ores of south India are surely to be considered responsible for the prolific and extensive occurrence of iron equipments in the megalithic and associated remains all over peninsular India. It would be an interesting study indeed to subject the iron objects from the various megalithic tombs to spectrographic analysis and relate them to the ores, and by examining and exploring the sources of the ores as well greater details than are at present available as to the processes of iron workings in south India in the days of the megaliths may be forthcoming. This would possibly throw more light on the iron industries in ancient times.

The south Indian deposits which have indeed played an important rôle in the development of the iron industry in India, several centuries before the Christian era, and their distribution deserve to be mentioned and are indicated below.

Magnetite occurs chiefly in the southern districts of Mysore. Haematite occurs in Shimoga, Chikmagalur, Dharwar and San-

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dur in Mysore, and Ratnagiri in Maharashtra. Magnetite-quartzes occur in the Districts of Salem and Tiruchirappalli (Trichinopoly) in Madras and Guntur in Andhra Pradesh, Haematite and ferruginous quartzes occur in Cuddapah, Andhra Pradesh, Ironstones (limonite and haematite) occur in Travancore and Malabar in Kerala.

NOTES AND REFERENCES

1. M. S. Krishnan, *op. cit.*, pp. 102ff.
2. The process has been described in detail by H. H. Coghlan in Metallurgical Analysis of Archaeological Materials: I, *Quantitative Methods in Archaeology*, (Viking Fund Publication in Anthropology: 28), Proceedings of the Wenner-Gren Foundation Congress, 1959, pp. 1-20.

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CHAPTER 11

TYPOLOGICAL COMPARISON OF THE IRON OBJECTS FROM IRAN, ESPECIALLY SIALK, AND FROM THE EARLY IRON AGE IN INDIA

(See tables 1—6)

A comparison of the tool types from Iran (figs. 11 & 14) and India (figs. 1-4; 15 & 16) in the early days of iron in both the countries, would indicate some obvious parallels. Though it is not yet possible firmly to establish an evolutional link between the two regions, it is clear that their links are close enough to lead to such a possibility. At Agha Evlar and Chagoulla Derré, the iron objects, (fig. 13) mostly weapons of war, show a different tradition from that obtaining in Sialk V or Sialk VI, (fig. 14) though the two groups are not very far removed from each other in point of time. The tools at Agha Evlar consist of daggers (fig. 13 A, nos. 1 & 2), axes (fig. 13A, no. 3), chisels (fig. 13A, no. 4), spear-head (fig. 13A, no. 5), and horse-bits (fig. 13A, no. 11). The daggers follow the earlier tradition of bronze tools with a long narrow tongue with median groove, springing from a hilted end. The axe (fig. 13A, no. 3) has a splayed cutting edge, and a barrel-shaped transverse socket for the grip. The chisel (fig. 13A, no. 4) has a broad but slightly splayed working end and a tanged end for hafting into a handle. The spear-head (fig. 13A, no. 5) is almond or leaf-shaped with a socketed hollow stem.

At Chagoulla Derré the spear-heads (fig. 13B, nos. 6 & 7) are longish and conical, usually with a median rib and a hollow-socketed stem for fixing to a shaft. The daggers (fig. 13B, nos. 8-13) have diverse handles, made of bronze, which are clasped at the broader end. That iron objects were preferred for their greater effectiveness is clearly indicated by the blades being made of iron in preference to ones of bronze, while the less functional part was made of bronze. The continued adherence to the hybrid form was possibly more as a matter of habit and sentimental inability to part with an ancient relic than pure considerations of utility.

At Sialk the hybrid combination has almost disappeared, obviously for reasons of a wastefully lengthier process of manufacture involved in it. A complete piece of tool could be produced with greater convenience and quicker than a composite tool,

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especially as bronze started losing ground as the functional metal and began to have more of decorative utility at the stage. At any rate, its inferiority to iron in striking power was recognized. While the spear-heads were easy to emulate, it had become obsolete to produce hybrid daggers and hence wisely discarded. The clasped joint was also a possible source of weakness, regardless of the offchance of the handles loosening themselves in course of time at the point of junction.

The simpler forms of Sialk V A or VI B (fig. 14) consisting, as they did, of arrow-heads, spear-heads, daggers, sickles and the horse-bits show indeed greater affinity with the tool types in the Painted Grey Ware levels and the succeeding levels of the Northern Black Polished Ware and even of the megaliths themselves, to a certain extent. The *ensemble* itself, to begin with, is apparently larger in scope than that obtaining in the contemporary levels of Chagoulla Derré or Agha Evlar, and are indicative of increasingly larger applications of the new metal.

A comparison of Sialk (fig. 14) objects with those from the cairn-burials (fig. 4) also suggests a family affinity. The simple forms of the spear-heads or arrow-heads point to the simple needs of the folks. But the trilobate barbed arrow-head (fig. 4, no. 4) from Moghul Ghundai points to an advancement beyond the rudimentary stage. Such forms, as stated earlier, had parallels in Afghanistan and point to the possible sources or direction of inspiration. Segmented or barbed arrow-heads occur in the megaliths as well, and lend support to the interconnexion between them and the cairn-burials.

The evidence of a broken sword-blade of iron with a bronze fastening at the hilt at Zangian[1] is another link with Iran and points to the inferred interconnexion between the two.

It is abundantly clear, however, that the tool forms of the copper-hoard assemblage (fig. 10) did not influence the Iron Age equipment. There is hardly any typological connexion between the two, conceding that the 'copper-hoards' had preceded in emergence the iron objects. The tools of possible western affinity (fig. 11, nos. 5-7) did not impart any of its verve or form to the Iron Age either.

The few copper tools found in early occupational levels in Indian stratigraphy, including a thin leaf-shaped arrow-head in Hastinapura, do not represent or indicate a basically different typological bias.

The source of the forms of tools evolved in iron have, therefore, to be looked for elsewhere. They may have grown locally in response to the environment, or they followed the tool forms

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with which the folks had already been familiar. After all, the Aryan invaders had forced their way through the most virile part of the subcontinent with efficient armour of their own with which the displacement of the once-mighty Harappans would have been impossible. The close connexion between the Sialk tool forms and those of the early Iron Age in India points almost to an irresistible inference which has indeed the semblance of probability. As to the disappearance of the remains of the tools themselves, another new and interesting evidence has come recently to light. The views of Wheeler that iron objects were comparatively much better preserved in the deliberately and carefully closed and sealed megalithic tombs than those left to themselves without plan or design have already been quoted (p. 9). Recently M. K. Ghosh, a former Member of the Parliament in India and a metal enthusiast, analyzed a few pieces of iron objects from the well-preserved megaliths of Sanur, and reported that the composition was free from metallic iron[2]. Obviously it had disappeared in the course of the disintegration that had set in, defying the protective condition of its preservation. The comparative absence or paucity of any tools to reckon with in the hollow interregnum, between the discomfiture of the Harappans and the heyday of the Aryans may possibly be similarly accounted for. While too much cannot and must not indeed be built upon the basis of a negative evidence, the phenomenon is considerably striking and a pointer. All this would lend further support of the idea of Aryan introduction of iron in India.

An objection that can be raised in this context is why the Sialk VI ceramics did not influence or impose itself on the Aryans. The question has been anticipated and answered before. A people on the trek *en masse* can scarcely be expected to carry their paraphernelia of pots and pans for obvious reasons. Nevertheless, they would surely have carried at least some vessels to transport water. But it was not difficult for them to pick up pottery and its traditions in the new lands where they moved in or settled (pp. 102, 194-5). In this connexion the rôle of the Shahi-tump pottery has already been mentioned. The Painted Grey Ware ceramic, which has been provisionally associated with the Aryans, was of high quality and also painted in a variety of designs. Though its use was limited it was no less attractive than the pottery of Sialk. In this context it may also be stated that though the *Ṛigveda* mentions the use of vessels, it does not specifically mention any earthern pots or the potter, which may probably mean that they did not have in their midst any potter though it can scarcely be reasoned that they had no pottery or did not know ceramics. This would make it easier to explain their adoption

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of somebody else's pottery, especially as a people on the march can scarcely manufacture their own (see also Chapter 13).

The *Atharveveda* (IV, 17, 4), however, mentions unburnt earthen vessels alongside burnt vessels, which are called *āma* and *nīlalohita*, respectively. Zimmer[3] translates *nīlalohita* as dark-red. It is interesting to note that while the bulk of the day-to-day pottery associated with the *de luxe* Painted Grey Ware is red, there is a variety that has been described by Lal as brownish-red, which fits Zimmer's description and follows the former's shapes and is also similarly painted. The word *nīla* can also be translated as blue and together with *lohita* may refer to the light bluish bias of the Painted Grey Ware and to its brownish-red companion at once. This point is not, however, pressed.

NOTES AND REFERENCES

1. *M.A.S.I.*, no. 43, p. 88.
2. According to a report presented to the Director-General of Archaeology in India.
3. H. Zimmer, *Altindishes Leben*, 1879, p. 253. For a detailed discussion on the subject see Chapter 13. It has been suggested that *nīlalohita* may perhaps be translated as black-and-red and may refer to the black-and-red ware ceramic, though its correlation with the archaeological evidence is not certain and cannot, therefore, be insisted upon.

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CHAPTER 12

LIFE IN THE EARLY IRON AGE

A. Life among the Users of the Painted Grey Ware

The excavations conducted so far at sites yielding the Painted Grey Ware have mostly been in the nature of index excavations, no attempt having been made so far to excavate anywhere horizontally or on a scale to compare with the excavations at Harappa or Mohenjo-daro. As a result the material equipments of cultural life recovered till now are comparatively meagre. The picture of the life that was led during the period labelled by the distinctive Ware is, therefore, neither as clear nor as full as one would expect and wish to unravel. The Aryan speakers, as the users of the Ware may now be called, came on the heels of the decline of mighty Harappa. The old tenor of life came suddenly to a halt, and the new pattern of the life that took its place lacked all the glamour and colour of the past, and the folks were launched upon a course of life that can be termed as poor in contrast.

There is yet another snag in the way of a full estimation of the lives of the new folks. The report of the excavations at Ahichchhatra, in District Bareilly, Uttar Pradesh, where the Painted Grey Ware was first noticed, is yet to see the light of the day. The other relevant excavations conducted at Purana Qila, Delhi, Rupar, District Ambala, Panjab, Alamgirpur, Sravasti, District, Bahraich, Uttar Pradesh and to an extent, even Ujjain have been rather briefly reported in comparison with the full report of the excavation at Hastinapura and a shorter report of the excavation at Kausambi. Notwithstanding these handicaps, a broad picture of the life among the Painted Grey Ware users as gleaned from the full or fragmentary reports is presented below.

The richest yield of the material remains of these folks is of course the tenacious relics of their pots and pans. While the Painted Grey Ware dominates the ceramic repertoire primarily in its quality as a *de luxe* ware, its use was limited to bowls and dishes. Alongside were pots of the other wares of everyday use like the brownish-grey ware, the plain red ware, the black-and-red ware. The brunt of the ceramic service was borne by the plain red ware, which accounted for jars and vessels for various

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domestic purposes, while the lighter service was taken by the other members of the miscellany, in the form, generally, of bowls and dishes. The painted designs on the Grey Ware speak of a taste for beauty and decoration, and the most familiar symbol of to-day, the *svastika,* was a favourite with these folks as well.

Not much has remained of the architecture of these days. It had to depend for its life-blood on mud, or, at best, sun-dried mud-bricks, and no more than barely recognizable lengths of walls in crumbling desolation can be accounted for. Burnt bricks were not, however, unknown as Ahichchhatra has shown[1].

It is interesting, nevertheless, to record that a variety of wild cane was used along with husks of rice to reinforce the mud or mud-brick walls with plaster as observed at Hastinapura. As rains were expected to be heavy in all the region where the Painted Grey ceramic occurs, as inferred from present experience, the roof may have had a thatch as mud could hardly be relied upon, and the cane should have played a prominent rôle in it perhaps as the wattle base.

It was a period when defensive fortification to safeguard the township against extraneous attacks of both floods and human enemies, regardless of the flimsiness of the residential remains enclosed, had begun to come up, as exemplified at Ujjain or Kausambi. As the towns grew up on river banks for various natural advantages that such situations conferred, the advantage of the river waters was also taken to surround the fortresses with unfordable moats that were at once deep and wide. The forts were provided with gateways and passages, that were properly cambered and secured against erosion by being cobbled on an adequate soling of hard clay.

The fort at Ujjain was roughly a parallelogram in shape, about a mile (1.6 km.) in length, north-south, and three-fourths of a mile (1.2 km.) across, east-west, and it was reinforced on the water-front along an incurving bend of the fickle stream, which rose frequently in spate, with a framework of neatly cut wooden logs (pl. IV), that served as a buffer and the first line of defence against the periodically rising waters. Apart from the ingenuity of the scheme, which was successfully carried out and maintained, it is to be wondered at that the ancients were undaunted by the problems of transporting lengths of 17 ft. (5.1 m.) and more of heavy logs of *Acacia Ferruginea* or *Tectona grandis* (pp. 16-17) which in their finished stage were about 10 in. (25.4 cm.) square. If they had to be finished at the spot, the lengths and measures to which the ancients went to transport the still heavier logs from the forested area can better be imagined than described,

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regardless of the labours of felling trees in the not-too-near forests.

The thought of the fort conjures up pictures of warfare. The equipments of the times were, no doubt flimsy by to-day's standards but consisted of arrow-heads of bone and copper and later of iron, besides, in course of time, spear-heads and daggers of iron. Hunting was doubtless an early and profitable undertaking.

Agriculture was the mainstay of life, and the crops were harvested and one of the principal grains[2] raised was of course rice, as Hastinapura has shown, lending support to the *Vedic* mention of *Vrīhi* and *dhānya,* which would mean rice and paddy respectively.

Copper as a metal could not take them very far, as very soon iron indicated larger possibilities than copper alone could grant. The repertoire of iron objects point to the many-sidedness of its application, comprising as it did, comprehensively, of knives, arrow-heads, spear-heads, wedges and axes. There is indication also of local manufacture of iron objects in the form of slags, found at Hastinapura. This meant indeed not only mining of ores but also smithy, involving the twin action of smelting and forging. The axes and wedges helped the Aryans to fell trees to provide them with firewood and charcoal and cut down forests on a large scale to reclaim areas for living and expansion than may have been possible earlier. The arrows and spears defended them against wild animals and human foes, and helped them to hunt down game for food while knives enabled them to carry on their daily avocations of sorts.

Fishing must indeed have been resorted to as indicated by conical terracotta net-sinkers as a means of increasing food supply.

It is also to be noted that writing, or at least engraving on a soft surface such as clay, had come into vogue as evidenced by a neatly worked bone point, to secure which a socket sheath was also available, as at Ujjain, though no trace of any written matter has come to light.

The use of a copper borer, as Hastinapura has shown, points to various kinds of craftsmanship in wood or metal of which, however, no direct evidence is to hand.

The articles of toiletry provide a modest outfit, consisting as they did of antimony rods and nail-parers of copper, and of a hollow terracotta object, with segmented interior, that has been described without adequate reason as hair-cleaner.

Among ornaments were the time-honoured bangles, but, rather strikingly, made of glass. That glass could be produced at this time is a thing to wonder about and is the earliest evidence India has so far known. Even on a small scale it stood for the

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beginnings of an industry that has reached a considerably high level to-day.

Beads, no doubt, strung together as necklaces, were made of diverse materials like agate, carnelian, jasper, glass, copper, bone and even terracotta and played an important rôle in ancient jewellery, in their spherical or barrel shapes. The beads of terracotta are usually pear-shaped and often biconal. These were supplemented by ear-ornaments in the shape of convex discs with concave sides, made of bones or agate, brightly polished, in a shape that lived in popularity for centuries of history, and has only slightly modified variants even to this day.

In spite of an advance in industries and exchange of commodities, coins do not seem to have come into vogue, and possibly barter was the principal means of exchange employed. The presence of coins in very limited numbers, as punch-marked coins, cannot, however, be ruled out as the evidence of Nagda has shown.

A basic and yet very essential industry should have been that of weaving baskets, whereupon at once art and skill were bestowed. The warp and woof of the baskets, even from their crumbling impressions upon the earth in which they had lain, are amazingly modern in form.

Though no material objects have been unearthed to convey objectively the religious life of the folks, the discovery of the evidence of what has been interpreted as sacrifice of cow at Ujjain indicates the importance attached to this practice, calculated no doubt to bestow benefits upon the faithful in a spiritual sense. This partakes of an important aspect of the life of the *Vedic* Aryans, and bids fair to be an additional argument in favour of the underlying equation of the *Vedic* Aryans with the users of Painted Grey Ware.

As a source of children's amusement discs of terracotta often decorated at the edge with notches or scallops or fashioned out of sherds have played their eternal rôle as hopscotches as also discs with double perforations, plastic variants of which are now on the market, through which strings are passed and dexterously pulled and released alternately to raise a music that children revel in. With a single central perforation they would have served as wheel to a child's toy. Even terracottas in the shape of human (Ujjain) and animal figurines as playthings, articles of decor, or pure essays in artistic creations, have made their appearance as Ujjain and Hastinapura have shown.

The picture thus culled together from straggling evidences, some on this site and some on the other, presents in its simplicity, despite its variety, a dismal contrast to the elaborate material culture of the preceding civilization that has the Indus valley

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as its focus. This was indeed the state of the beginnings of the Aryan civilization in India as revealed so far by archaeology, and more is yet to come.

B. Life among the Users of the N.B.P. Ware

The users of the N.B.P. Ware followed closely on the heels of the Painted Grey Ware-using people, and it would, therefore, be worthwhile to consider the various aspects of life in the subsequent period, in a sequence after the Painted Grey Ware so that the differences may be seen in clear perspective. Ahichchhatra had shown an overlap between the two cultural phases, and Sravasti has almost shown that the one derived itself from the latter. The accumulating evidence is just as it should be, for they do not surely represent two different sets of people in the sense in which the Indus valley people and the Aryans apparently were. The Painted Grey Ware phase ought to culminate in the N.B.P. Ware phase in an evolutional trend.

Architecture in the new era weaned itself away from the lure of mud and mud-bricks, and used more increasingly burnt bricks which had already begun, limitedly, to appear in the later days of the earlier period. But it was yet confined to buildings or structures of public utility, such as the barn and drain at Hastinapura or the tank, canal and well in Ujjain. At the latter site the limited use of dressed stone (pl. V) is also attested. The latter was again a gift of iron tools and equipments.

Fortifications continued in their glorious career but now wagons to transport men and sinews of war moved hourly in and out of the defences through, no doubt, their well-guarded passages over the cobbled roads, which have borne to this day the indelible imprint of their wheel-marks in ruts. The width works out to 5 ft. 9 in. (about 1.75 cm.) which is accidentally almost the universal gauge of bullock-drawn wagons in vogue at the time.

Repairs to the fortifications were now executed with burnt bricks to stop a sudden breach and present a stout veneer to the gushing tongues of the angry river swollen in flood, or when the waters in the river had subsided, causing a fall in the level of water running through the moat, by shortening its width to enable the same volume of water to serve effectively a narrower channel, and by safeguarding the turns and bends with bricks. Mud-bricks or layers of clay continued to serve as walls of houses as of old.

The pottery, the main characteristic of the people's needs and genius, has assumed a different miscellany, no less sturdier than before. The Northern Black Polished Ware has replaced the

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Painted Grey Ware as the ceramic *par excellence,* and is infinitely more sturdy, as judged from its metallic sound. It presented a variety unknown to the Painted Grey Ware in its diversity of shade, which shifted from coal-tar black, through steel-grey and silvery resplendant to a golden shine, and was sometimes, though rarely, painted in a decorative essay. As before it monopolized, with an exception in the case of the rimless *hāṅḍi,* the *de luxe* shapes of bowls and dishes or lids of exquisite caskets for use on special occasions. They were so much valued that broken pieces were joined and held together by copper rivets. The other associates in the plain red ware, black-slipped ware and a vesiculated ware shared the other various burdens of early ceramics in daily life.

The warfare as of old continued to be conducted but more exclusively with iron equipments, such as the spear-heads and arrow-heads, axes, daggers and knives, with a substantial support from the bone-tipped arrows, no doubt, for reasons of economy and for easy availability. Copper lost its face and had no place in the armoury. Iron had dug itself in.

In agriculture sickles of iron replaced those of other materials and helped the peasant to gather his sheaves more effectively. Fishing and hunting provided food of essential nature but of varied taste as before, as judged from net-sinkers and equipments of the chase.

The weaving of cloth became stabilized, as indicated by the spindle-whorls employed in the spinning by yarn and, now and then, by a bit of rope well preserved by centuries of immersion in the preserving waters of the moat (at Ujjain) and its dregs of moist clay or the impression of the warp and woof of a piece of textile on the surface of a sherd (Ujjain).

The articles of toiletry remained the same in character, comprising, as they did of old, of kohl-sticks or (antimony-rods), nail-parers and hair-cleaners, but had the added equipments of the familiar rough and granular-surfaced skin rubber of terra-cotta, and the pigment stick of bone or ivory to add to the attractions of beauty. A comb was also there, sometimes in ivory, often gathered together and rivetted with copper pins when broken, or an exquisite handle of mirror, made of ivory. Such objects were not, of course, common and reflected then, as they do even now, luxury and prosperity.

Among ornaments, the pristine simplicity gives way to a sophistication that the new age brought about with its infinite variety of glass beads, in monochrome and in diverse colours, as well as in shapes, or of stones which covered agate, carnelian,

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amethyst, bloodstone, chalcedony, crystal, faience, jasper, lapis lazuli, soap-stone, steatite, coral and, of course, the age-old terracotta. Beads of copper were also worn.

Bangles had for their material terracotta, glass, copper and shell, and rings of glass, shell and copper and of even horn with a bezel were common. These were, no doubt, cheerfully worn.

Ear-ornaments made of polished jasper or copper weighed heavily down on the delicate ear lobes in the shape of bi-convex discs with a concave side, and were worn, inferably, in the fashion of the sculptured figures in stone of early medieval and medieval days. Occasionally the convex sides of mirror-like polished discs were additionally embellished with a gold-foil firmly fitted into place with worked decorative designs on the face.

Coins in the form of punch-marked and uninscribed bits, usually cast, of copper removed the old uncertainty as to the medium of exchange, and recorded at once a technological advancement and the growing prosperity and volume of exchange of goods. The diversity of materials going into use as objects of daily life should suggest either local manufacture or imports, more likely the latter, resulting in the establishment of distant contacts, travels, and the resultant flow of cultural influences in different directions to the common advantage of all. Such a phenomenon also explains the quick dispersal of cultural traits and the unification of cultural patterns over the vast expanses of the land.

Amusements continued to be as simple as in the olden days, though it expanded its scope. The children, no longer content merely with hopscotches, or perforated discs and wheels, began to have toys in the shape of articles of terracotta in the shape of diverse animals such as the elephant or the bull. The elephant at Hastinapura and Ahichchhatra was the recipient of a very careful and artistic treatment. Apart from the likeness to real nature, they had decorative patterns in the form of circles or leafy patterns or *chakras* (wheels) stamped, notched or pierced on them. Human figurines must also have had a rôle in it in the form of elaborately accoutred males and females, the latter outnumbering the former. Whether these figures had any religious or ritualistic significance is not known. It would be worthwhile to note, however, that female figures delineated as sporting with a parrot or a swan were the most popular form of art in terracotta.

Terracotta lamps, with a flat base and oval almond-like shape, may well have been playthings, but were with greater

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likelihood employed usefully to illuminate through the darkness of the night. The pinched channel for wicks bear the stain of soot, from use, inferably in a fatty medium.

A large number of terracotta crucibles, with their outer surfaces enamelled or vitrified were obviously employed in the smelting of metals on small scales and is a pointer to the trade of the metal craftsman.

The days of copper in an age of iron are expected to be lean, and its field shrinks increasingly with the passage of time. Iron invaded the household as well and soon ousted copper from its place.

Apart from going round wrists as bangles, it came fully into its own as chisels and drills, the primary tools of the carpenter, axe, knife, clamps, nails and also bowls, limitedly though, following the shapes available in pottery, and ladles with horizontal or vertical handles, besides, of course, daggers, arrow-heads and spear-heads for use in warfare and hunting. The tenacious smear of the blood of a bird on one of the bone arrow-heads at Ujjain points obviously to their use and they not merely added to the fighting equipments of metal, but as a hunting weapon put bird's flesh and, inferably, flesh of other edible animals on their menu.

Such was the picture of the diversity of life and its expanding scope and hold on nature that was ushered in by the extensive use of iron. Needless to say, it was richer and more prosperous than that of the one preceding it, though the limitations of the excavations during the last twenty years made it scarcely possible to obtain an adequately representative picture, not to speak of a complete reconstruction of the life that had sprung into vigour and ebbed away.

The increased efficiency of iron, its larger production as a result of the discoveries of sources of ores found by deliberate exploration and its more extensive exploitation as a consequence made it possible to cut down the wooded countryside, lay roads, or cut-passages through the distant parts, which were unexplored or little known, and bring them closer together and make possible rapid dispersal of technological advances and articles of utility, bringing them within the reach of peoples widely separated from one another. A common technological link united peoples over distant regions and helped evolve a common cultural pattern, ever growing in its scope and compass, with a much quicker process of formation in the wake of the new metal. Such was indeed the impact of the Iron Age in its early days. The process had begun earlier in the days of the Painted Grey Ware but was accentuated and accelerated during the period of the Northern Black Polished Ware.

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C. Life in the Pre-N.B.P. Ware Iron Age Phase

The chalcolithic tenor of life in west and central India and the upper Deccan seems to have received a jolt after it had run its course for several centuries for a reason which now seems to be widespread flood. At Nevasa or Nagda there is a black clayey deposit sealing the stratigraphical accumulation of the previous period. The clay from Nagda was analyzed by B. B. Lal, Archaeological Chemist in India, and found to be the result of stagnation of standing waters and made up of decomposed vegetation. The site appears, for sound reasons, to have been abandoned for a while. When it was reoccupied, not very much later, the use of iron had been acquired, as the evidence at Nagda shows. It is supported, as stated before, by the evidence of Eran and Prakash.

The people had not, naturally, weaned themselves completely from their centuries-old chalcolithic moorings, but the acquaintance with iron gave them a new power and a new sense of security, and they began progressively to share in the common heritage of the Iron Age.

The continued use of microliths—as many as 112 being found in Nagda—as of the tradition of the painted black-and-red ware pottery alongside newer fabrics and shapes do indeed point to a commingling of two different traditions.

Houses continued to be made as before of mud-bricks or mere mud, burnt bricks being still not in vogue. Clearly, mud-houses were strong enough to withstand the stress and strain of the climate, particularly the rains, which, as can be inferred from modern experience, could not have been meagre. A roof of thatch or straw, and walls with protective plaster, as in the slightly earlier days at Hastinapura, seem to be indicated.

The use of iron gave these people distinct advantages over copper, and its extensive use is indicated by the find of 29 objects at Nagda, beginning with a well-formed celt or chopper from the earliest days. The assemblage of iron equipments, comprising spear-heads, arrow-heads, including the tanged types, knives, blades, rings or clamps for fastening tools possibly also axes of the socketed type, besides a chopper or celt, point to divergent and yet specialized applications of iron objects. The specialized tools or weapons of attack and defence suggests a possibly less peaceful life than in the earlier days when microliths and comparatively flimsy copper implements were the mainstay of defence and offence. By this time the Aryan tribes had been expanding themselves in different directions, and should have been at pains to safeguard their expansionist endeavours in search of newer lands and prosperity. It was not until

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the troublous days had ended that the new land of the Aryan adoption was parcelled out into sixteen *Mahājanapadas* or kingdoms. By the middle of the 6th century B.C. some kind of stability had been reached, though, as a result of trials of strength and tribulations of sorts, four of these kingdoms, namely, Magadha, Avanti, Vatsa and Kosala became the most powerful and prosperous. The wars of Pradyota, who was a contemporary of the Buddha and himself king of Avanti (the Ujjain country), which encompassed Navdatoli or Maheshwar and Nagda, were fought into the enemies' camps, away from the capital as in the region of Taxila or on the borders of Kausambi or even of Pataliputra (Patna). Rajgir itself was threatened to be attacked. All these came in the wake of a prosperous situation that had been steadily built up over the past centuries. The organized expansion and parcelling out of territory should have followed the cutting down of the barriers of hills, forests and rivers, and laying of roads that passed from one city to another. All this and much more that must be read between the lines and taken for granted grew with rapid strides after the coming of iron.

It must be recognized that with the introduction of Buddhism an order of ascetics, i.e., monks and nuns, came rapidly into being and for their residence and religious practices monasteries began to be thrown up all over the country. Such an India-wide order could only be sustained by public munificence. For the country to be in a position to support vast numbers of the economically unproductive order of monks and nuns, considerable prosperity is indicated. Such a prosperous situation, judged even from the days under consideration, could not have been built up all on a sudden. It means centuries of patient hard-work, and the existence of industries and commerce, and imports and exports. Such things must have had an organized pattern even earlier than the days of the Buddha. The times under consideration were indeed the formative phase against the background of the prosperity of the early historical period. It may be conceded that all this was, indirectly, the gift of iron, which had helped pave the way.

In contrast to the use of iron, copper was confined to less important uses, though its continuance in the material economy is beyond dispute. Copper was relegated to such forms as the antimony-rod (kohl-stick), or objects of indeterminate shape and utility.

Microliths could not have been of much use in a metal economy dominated by iron, though they were indeed produced, perhaps as a matter of habit, as the oval flats of stone with battered and rounded edges recognized as fabricators, clearly

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indicate. The use of microliths in this period would have been confined at the most to the cutting and paring of vegetables and fruits.

In ceramics, new wares and forms made their appearance while the older tradition continued. The new developments comprised the black-slipped ware, a granular-surfaced coarse ware called the vesiculated ware and a double-slipped ware, which had a black slip over a red-slipped base. They had parallels in comparable levels at Ujjain or even in distant Ahichchhatra. But the older wares comprising (i) the black-on-red painted ware, (ii) black-and-red ware, (iii) the burnished grey, and (iv) the plain red ware continued alongside. These indicate that the old and new lived together adjusting themselves to the needs and tastes of the times. The tradition of painting in black on the red pottery or decorating with incised and applique patterns point to the old and rooted faith in decoration.

The domestic equipment of the kitchen or household comprised the unlegged quern, hollowed by heavy use, for the grinding of grains, and pestles to match. The repertoire of tools of sorts consisted of mace-heads, sling-stones, pounding stones and hammers as a legacy of the past.

The spindle-whorls of terracotta follow the shape of pears in vogue since the earlier days, pointing to spinning and its corollary, weaving, which is further substantiated by a double-pointed object of ivory with a median recess suggesting the shape of a shuttle, an essential equipment of looms.

The ornaments were not confined as before to bangles and beads, but included also the ear-ornaments. The bangles came to be made now of glass, an evidence that agrees with that from Hastinapura, though the use of glass was still rather small. The beads were made of terracotta, shell, stone and ivory. The beads of terracotta were in the shape of pears, vases, bicones and cylinders, while those made of different varieties of stone such as carnelian, agate, chalcedony and jade were either barrel-shaped or biconal, with rare exceptions of groove-collared specimens. The shapes still speak of a simple taste, neither enriched nor spoilt by sophistication, except for an attractive *āmalaka*-shaped bead in ivory of fastidious fancy besides those of coral.

The ear-ornaments, circular in shape, are made of terracotta for the not so opulent, and of jasper and agate, very laboriously and carefully finished, for the fastidious. A single specimen of glass dics with shell inlay speaks not only of expert workmanship but also a fanciful taste. The high polish that the discs bear has the reflective brightness of a mirror, and the industry that

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produced this article of luxury can be expected to have supplied the needs of a far-flung market. Nagda, after all, was a comparatively small settlement within a territory of which Ujjain was obviously the dominating city. The evidence of local manufacture of the mirror-like polished ear-ornaments of semi-precious stones[3] at Ujjain would point to such a possibility and also to the source. Jasper and agate, specially fancied for ear-ornaments, were available in plenty in the region around Ujjain.

The toilet articles of this period include the well-known antimony-rods of copper to apply collyrium to the edges of the eyes, no doubt, as much in the time-honoured effort to combat the affections of the eye as to enhance its attractiveness by imparting to it the loveliness of the doe-eye, an eternal feminine weakness. The presence of a decorated comb of ivory indicates, apart from the ivory engraver's art, even if not local, the users' financial status as well as a taste for beauty. This speaks of an economy that envisaged a surplus of articles of luxury after meeting the bare necessaries and comforts of life. It implies also, possibly, import from outside in exchange for local artcles of value, establishing widespread trade and commerce.

A flattish fragment of ivory, shaped to suggest symbolically the human figure, marked decoratively with circlets could have served either as a pendant or an object of reverence, often recognized as a form of mother goddess.

A human-shaped figure in ivory with a naturalistic head and a pronounced hip would suggest a deliberately assumed pose of grace, or of coquetry in curves, unless it is a presentation in cameo of the dancing female form. Though it would indeed be wrong to allow imagination to overstep the limits of objective observation, the possibility of dancing as an amusement and an art being in vogue cannot be discarded. The dancing female from Mohenjo-daro, as a still earlier evidence in the line, can easily be quoted as a possible distant source of inspiration. As a work of art, of the ivory carver, it has delicacy and grace and, of course, naturalistic features. These figures were all modelled and were recognizably of human shape.

Several conical objects of terracotta, with their tops truncated, served possibly as gamesmen of a kind indicating a game of patience and leisure. A specimen with a horizontal perforation across the top suggests a net-sinker employed in fishing, for which the rivers on which the settlements grew provided ample scope.

Agriculture as usual was, of course, the main occupation and means of sustenance. Though no remains of hoes or ploughshares can be accounted for, the use of the so-called mace-heads as

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weights for digging sticks, whether reinforced at the working end with copper or iron or not, can be conceded.

The bare fields around bear a mantle of the black cotton soil, suitable for a variety of grains besides cotton. It is to be noted, however, that the next succeeding period at Nagda during the use of the Northern Black Polished Ware knew the use of rice,[1] though this staple grain was known earlier at Ujjain. It can be presumed that rice formed a part of the dietary at the time in the light of the added evidence of its occurrence at Lothal in the Harappan levels, or at Hastinapura in association with the Painted Grey Ware.

The common evidence of bone-points with a thick stub and sharp working end in this period at Nagda, at Hastinapura in the Painted Grey Ware levels and at Ujjain in the comparable pre-Northern Black Polished Ware levels would either indicate the thriving of the engraver's art or of writing.

The evidence of man's multifarious doings at Nagda in its pre-N.B.P. Ware phase broadly corroborates and supplements the evidence of the Painted Grey Ware levels of Hastinapura and of the associable period at Ujjain and elsewhere.

D. Life among the Megalith-Builders of South India

The megaliths of south India represent a distinctive phase of culture that came in succession to the primitive neolithic—chalcolithic culture of south India. The difference in the cultural equipments of the two phases of life was enormous, for the latter also meant the coming in of a new people, characterized among others, by brachycephalic features in the midst of the native Proto-Australoids, on the present showing. A cultural conquest was at once made and the indigenous people succumbed to the force and vigour of the newcomers. While the brachycephalic features have been observed, there are no doubt several others to be found among the conquerors, the bulk of them speaking, as is now growing increasingly clear, the Dravidian tongue.

The society that had lived in timber houses, raised crops on small scales, used copper and bronze for some of their domestic needs in the form of copper or bronze rods or chisels and the like and stone implements in the form of neolithic polished celts and microlithic knife blades. It also used a greyish ceramic in the shapes of jars, for cooking and storage, and dishes, occasionally daubed hesitantly with an irregular-lined evanescent paint of red. The people buried their adults in pits in extended position, and their infants and children in grey-coloured jars or urns. They were influenced a little by the more vigorous chalcolithic

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culture of west-central India and the upper Deccan at the fringes of their geographical horizons in the north. The chalcolithic culture in its end-phase had merged almost miraculously and imperceptibly into the megalithic culture that spread into the south in force.

The new culture spread rapidly far and wide into the peninsula and flowered into a variegated and yet unified pattern of life that filled every nook and corner of the new land of its adoption. The acquaintance and extensive use of iron, made possible by their knowledge of mining and metallurgy and the exploitation of the considerably rich deposits of iron ores in Mysore, Hyderabad and Madras made all the difference in their lives. It was one of the industries that engaged and provided with food quite a large section of the society, though the methods of working could not have come anywhere near the versatile blast furnaces of to-day. The Wootz process of smelting iron in crucibles, in vogue among the native iron workers, seems to have been largely practised, and against this background it is to be wondered at that they could forge to shape not merely small arrowheads, but javelins and spears or crowbars considerably impressive (6-7 ft. or 183-213 cm.) in length. The process was at once skilful and exacting and called for infinite patience and concentration, such as can emerge in an efficiently and vigorously organized society, with a centralized control and direction.

Of their architecture next to nothing is known, except that they lived in all probability in houses that employed wooden posts to hold the walls and roof together, and no doubt wattle, or timber had to be used for the purpose. It involved naturally the felling of trees and dressing of planks, with their axes and chisels of iron.

Iron was not, however, the only metal used. In the wake of metallurgical experience came the use, though on smaller scales, of gold and silver, while bronze and copper were not altogether absent.

The use of large-sized stones in the construction of the graves also marked a state in technological advancement, for, though readily available boulders were freely used, the rocks had to be split to extract slabs of desired size and thickness to form the cist-chamber. In an age that knew no gun-powder or explosive, the application of heat to chosen surfaces of rock after they had been marked out and weakened by preliminary drilling of holes along the edges of the desired size of slab, and sudden cooling by the application of water seem to have been the process that delivered the goods. That was indeed not the end of the business as the slabs had to be carried to the spot. Either they were hauled

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by means of ropes and carried on supports on the shoulders of an army of labourers or they were rolled by leverage on logs of wood to the desired place. The processes of quarrying and easy transport controlled by organized behaviour had thus to be mastered. In this task their chisels, wedges and crowbars of iron were freely employed.

The stone cutter's job was not, however, limited to the splitting of rocks; he had often to dress the stones, first laboriously extracted, especially in areas where the rock was soft enough to permit dressing, and also to cut a little hole, either oval or circular on one of the slabs that was chosen to carry the porthole, a very skilful undertaking indeed. The society that could command his dexterous service must have paid him handsomely indeed to maintain his cheer and efficiency.

On the Malabar coast the cheesy-soft lateritic sub-soil lent itself easily to be scooped into subterannean caves, to contain the mortal remains, and perfection in this art was attained after much practice.

Yet such a vigorous people were primarily an agricultural community and, after their peregrinations for *Lebensraum* had ceased, they remained rooted to the soil. It is not a marvel that they built their burials rather away from their haunts of habitation as well as from any plot of land that could be tilled, i.e. on the foothills of rocky areas, or amid barren outcrops. But the sites chosen were always in the neighbourhood of a pool of water that was at once adequate enough to last throughout the year to supply their needs at home and for irrigating their cultivable fields. They huddled together in areas skirted by an extensive and natural depression on grounds that looked like having a large catchment area wherefrom all the waters drained into the hollow, and if the gradient seemed to stand in the way, they were quick enough to press home the advantage by bunding up the sloping side and imprisoning the waters that nature had bountifully bestowed upon them. Tank irrigation has lasted through the mists of history to this day in the service of man in the south.

The megalithic people seldom allowed the graves to encroach upon or sprawl into arable lands, though it is surmised that the spirit of the dead, symbolized even by an empty dolmenoid-cist built on a rocky outcrop and rising gigantically above the fields as at Uttiramerur, in District Chingleput, Madras, at once guarded the standing crops and bestowed prosperity upon the faithful community.

Rice is the staple food in the south to-day. It may have been so even in the days of the megaliths, as grains of rice have been

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found in associated levels at Kunnattur[5] in District Chingleput, Madras. Incidentally it is also the earliest evidence of the use of rice so far known in south India. As rice grows best to-day in southern and eastern India, the climate and temperature under which it thrived could not then have been very different from what obtains to-day.

Hunting should indeed have been another means of varying and augmenting their food supply as the equipments of arrow-heads or spears would suggest. Stone balls may as well have been employed with slings to strike and bring to ground a running game. It cannot be asserted with certainty if the flesh of cows was eaten at the time, but the presence of bones of *Bos indicus Linn* (the domestic humped cattle of India) does indeed point to such a possibility. But sheep (*Ovis vignei Blyth*) and goat (*Capra Sp.*) and the domestic fowl (*Gallus sp.*) may well have gone into their dietary,[6] for the bones of these animals have been found in the graves.

It is interesting to note that the wolf or hyena had probably been stalking in the neighbourhood of the megalithic habitations, and had to be hunted down to save the sheep, goats and fowl from their clutches. Their bones also found interment along with the rest to unfold the interesting vignettes of the day-to-day life the megalith-builders led.

For the ploughing of the soil bulls may have been used as now, while the cows provided the milk. The sheep and goats were domesticated for their obvious advantages, nor was the poultry lagging behind. The diet of the megalith-builders bids fair to have been rich in carbohydrates and proteins that sustained well in balance the muscles that were engaged in constantly arduous tasks involved in all their undertakings indicated above.

The occasional occurrence of the remains of a horse as at Junapani, near Nagpur, or the fragments of iron horse-bits indicate also the domestication and breedng of horses, besides their use on the chase and hunt and internecine tribal warfare, which the vast miscellany of arms in any single grave would easily vouch for.

Yet another big industry was of the pot-maker. Not only was the pottery employed of high quality, it was also varied, consisting as it did of the ubiquitous black-and-red ware, the black-slipped ware and the red ware, represented in a variety of shapes and sizes, encompassing bowls, dishes, jars, vases, lids, ring-stands for supporting larger vessels and three-footed jars that could stand on their own. Sometimes, though rarely, the vessels were decorated by painting. They were also scratched with marks of graffiti. Not all vessels were of equal efficiency or strength.

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For the urn-burials large jars in a coarse and gritty red ware with suitable lids of matching sizes were produced. For the sarcophagi, which were, in fact, terracotta coffins in two parts with a lower container and an upper lid, oblong in shape, and supported on several rows of hollow elephantine legs, recalling the caterpillar, a slightly different technique had to be employed. Both urns and sarcophagi, because, in the former case, of their size, and in the latter of their size and shape, had to be hand-made. The latter called sometimes for artistic skill, as a zoomorphic form, sporting for instance the head of a ram, had to be produced. The burning of both the types, because essentially of their size, called for great caution and from the experience of damage from expanding gases during burning holes were provided here and there on the walls of the urns or sarcophagi for the gases to escape and prevent cracking of the walls. All the pottery belonged to the necropole, and, paradoxically, the flimsy habitations reveal not much of the rich miscellany of the sepulchral ceramics. Yet, if one must stop to think and ask oneself the reason for such large number of pots that go with the dead, the explanation may flash across the mind that the dead spirits had probably a life beyond and needed food and drink to sustain themselves in their endless (?) journey. The pots and pans bore the humble tribute of those that still lived and cared for them and provided the essential sustenance in food and drink. This would probably explain the annual celebrations that some tribes, who practise megalithism to-day, hold in almost unrecognizable attenuation mentioned earlier, and bring food and drink to the megalithic relics to propitiate the dead spirit. A similar practice prevails among the Hindus as well, as they offer food and drink to the *pretas* on specified occasions.

The sepulchral features display a variety, with an underlying cultural link, in response and adjustment to changing geological conditions and local reactions or influences. The basic features are, however, commonly shared. The primary exposure of the body at a place of maceration[7] presupposes an underlying spirit of service to some ideas of divinity even in death, as the Zoroastrian Parsees continue to practise to this day, allowing the beasts and birds to feast on the mortal remains. Here is an example of stoic sacrifice of sentiments for a cause that can at best be guessed but not determined. The bundling together of gathered bones of several individuals and their common interment may either indicate kinship or ties of family. As the raising of a megalithic tomb, except in the simplest form of the urn-burial without the megalithic appendage, invariably involved considerable effort, perhaps of the entire community, a single mega-

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lith could not be assigned to just one person at a time. The collection of bones of several individuals imply waiting for a fairly long period for several deaths to take place in a family or community, so that the spirits hovering over their remains could sleep together in the place of death. It may be recalled that the megalithic tombs in the west contained multiple burials to the extent of 40 or 50 together, pushed periodically into the hold, repetitively over a period of time, each new series of bones pushing and pressing the earlier away, until it could hold no more. But in India repeated use of the tomb is seldom observed. Obviously there was a time-lag between the erection of the tomb and the actual interment so that as many as could be accommodated at a single ceremony were interred at a time and the burial sealed once for all.

Yet a variant of the usual mode of the disposal of the dead was to lay the full body into a pit or dolmenoid-cist as Nagarjunakonda and Maski have shown recently. Even so they were within the bounds of megalithic features and partook fully of the megalithic ritual.

The feature of the port-hole or opening, usually on the eastern side, rooted in the west, had a significance that has to be guessed. If it was connected with the direction of the rising sun and the axis of the sun's diurnal course, as the burials, in all possible cases, were oriented east-west, a religious significance connected with the worship of the sun-god has to be postulated as a mere surmise. Or was the port-hole a means of the escape of the souls of the buried dead to eternity or reincarnation, left solicitously by the faithful posterity? None can as yet provide the answer.

As to the variety of their activities the miscellany of interred tools and weapons are an ample index, and these have been recounted above. The justification for the stowing away of such large numbers of still utile equipment is hard to find. If imagination must come to succour, they represented probably the belongings of the dead and were embowelled into the earth with their earthly owners since their need had ceased. They consisted at once of the weapons and tools of the vigorous male, the ornaments or the grinding slab and pestle of the feminine guardians of the household and the little playthings and tops of the forlorn children who died long before their years.

On the softer side the ornaments which comprised beads of stones like agate and carnelian, sometimes etched, ornaments of shell of a large variety, or objects of gold in the form of beads or diadems and even of silver and copper or bronze speak of the love for decorating the person and no less of the jeweller's craft and trade.

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The toys that remind us of the innocent young consisted of a stone ball here or a terracotta animal form there or a miniature jar somewhere else.

All this would show the urban bias of the megalith-builders, who had to depend as much on agriculture as on the chase or hunt and domestication of animals, or various crafts and industries to sustain the varied pattern of life that they revelled in. It is clear that their life was different from any that was lived in the more northerly regions of the river valleys in north India, either during the heyday of the Painted Grey Ware or the Northern Black Polished Ware. There was greater vigour and interest in life, and awed reverence for the dead unmatched elsewhere. They were at once capable and prepared to pay the price for all their *joie de vivre*. They stand for a different people and divergent tradition. And yet, alas, the paradox remains that not much trace of their little townships that teemed anciently with the hum of varied activity in the ordinary business of life has come to light!

E. Life among the Cairn-Builders of Indo-Iranian Borderlands

Very little indeed remains to be said about the life of the cairn-burial folks of Pakistan as most aspects of their life as gleaned from scattered relics of old have already been covered earlier.

To recapitulate, it may, however, be stated that though little is known of their architecture, it is likely that they built it dry out of rubble stone that was available in plenty in their neighbourhood.

Being located in a comparatively arid area, which may no doubt have been wetter in the ancient days than they are to-day, the folks apparently depended less on agriculture than on the rearing of domestic animals, the most important of which was of course the horse, which was indeed dearly loved, as their remains have been found interred together with those of men. The flattish flasks (pl. II) of pottery, with loops to pass a cord through and keep them in suspension, point to arid conditions and movements in search of food and fodder through dry areas for the existence of men and animals, and surely, on horseback, which was at once an efficient and quick means of transport. Yet they were not nomads, for their pottery, painted in a variety of ways, indicates settled conditions and a love for beauty and delicacy, and presuppose leisure.

They lived in a close-knit community, and built their burials by common effort, and the multiplicity of human remains point to multiple burials as in the megaliths. The fractional post-excarnation burials again speak of a similar attitude to the

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utility of the dead flesh to the carrion beasts, in service, and humility to an awe-inspiring and unknown Divinity. The opening in the wall of the burial chamber, of which only a single instance has come to light, betrays a distant inspiration of cultural and chronological significance, if not also spiritual, which has been recounted before.

The iron tools encompassing swords, blades, knives and arrow-heads speak of their utiilty in the hunt and chase and bespeak a typological connexion with Iran.

Their womenfolk's love of ornaments is also indicated by the remains of anklets, bracelets and rings of bronze, silver or copper.

Life indeed was not drab or dull, but many-sided and, to an extent, even leisurely. But this is not all that may be said about these vigorous people, for excavations conducted under modern scientific conditions might reveal more to the spade and eye than it has been our fortune so far to observe or comment upon.

As to relating the inadequate and unrepresentatively fragmentary picture of the life in the Iron Age reconstructed above with the help of scraps of archaeological evidence to the literary accounts of the *Vedas,* or even later literature, if only to see if they tally, the stage is decidedly premature, conceding that such a hypothetical correspondence would be possible to find some day. Yet these partial portraits serve their purpose of indicating the technological advances and heights of artistic merit attained by the ancient dwellers of the land, besides their economic conditions and the general tenor of their lives. Instead of treating the evidence as isolated items of information, the connected trends of life in the early Iron Age in India at different stages and in different zones have been tentativly presented here.

NOTES AND REFERENCES

1. *I.A.*, 1963-64, Section I (unpublished).
2. S. S. Ghosh, Further records of Rice (Orgza. supp.) from ancient India, *Indian Forester,* Vol. 87, no. 5, p. 296.
3. N. R. Banerjee, The Technique of the Manufacture of Stone Beads in ancient Ujjain, *J.A.S., op. cit.*
4. S. S. Ghosh, *op. cit.*
5. *Ibid.*
6. H. K. Bose, *A.I.*, no. 15, p. 42.
7. Pit circles had been earlier suggested as the place for maceration. A reconsideration of the evidence has not sustained this theory. Father Victor Rosner, S.J., of Ranchi has drawn my attention to flat surfaces of rock, with the sides deliberately scooped, amidst groups of dolmenoid cists in the Anamalai Hills. He calls them sacrificial stones. These, to my mind, appear to have served as flat tables on a height as the 'towers of silence.' See V. Rosner, Dolmens 'in the Anamalai Hills, South India, *Anthropos,* Vol. 54, 1959 ,p. 176, pl. Ic.

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CHAPTER 13

FRESH LIGHT ON THE PROBLEMS OF THE IRON AGE IN INDIA

A. General

Time and tide wait for none: it is an age-old proverb, and it is as true to-day in archaeology as in any other field. Between the end of 1962, when this book was written, and the end of 1965, when it is about to see the light of the day, nearly three years have passed. During this period a good deal of fresh evidence has been found and many new interpretations[1] of the data affecting the problems of the Iron Age in India offered. In the meantime a Seminar on the Prehistory and Protohistory of India was organized by the Deccan College under the auspices of the University Grants Commission at Poona in May 1964.[2] The new data, the principal interpretations thereof and the emergent position as a result of the discussions freely held at Poona have been fully considered and the salient points are presented below with a view to making the study up-to-date.

B. Fresh Evidence of the use of Iron in the Early Iron Age*

(i) *Iron in Association with the Painted Grey Ware*

In recent years further evidence has been found of the co-occurrence of iron and the Painted Grey Ware at a number of sites, namely, at Atranjikhera,[3] in District Etah and Ahichchhatra,[4] in District Bareilly, Uttar Pradesh, Bairat,[5] in District Jaipur, and Noh,[6] in District Bharatpur, Rajasthan. Besides, the small-scale excavations conducted at Hastinapura,[7] in 1962, have yielded actual specimens of finished iron objects in the form of nails and knife-blades from the middle levels of the Painted Grey Ware deposit. Earlier, in the excavations of 1950-52, only slags had been found, as pointed out before (p. 4). At the same time it is to be noted that iron has not so far been found stratigraphically below the deposits of the Painted Grey Ware anywhere.[8]

The most crucial evidence as well as the most prolific on the assemblage of iron tools is indeed from Atranjikhera, where the

* Though many sites with deposits of iron objects in the levels of the N.B.P. Ware have been found, the publications thereof or the notices are not adequate enough to justify extensive treatment at this stage and it is, therefore, left out of the envisaged scheme of supplementing what has already been presented in Chapter 7 (pp. 170-77).

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iron objects, appeared at the very initial stage of the Painted Grey Ware. The shapes of the objects were not, however, very distinct at the early stage i.e. the first of the four phases of the Painted Grey Ware, though they become recognizable in the second phase, along with an increase in their number and variety as time proceeded with a culmination in the fourth or last phase of the Painted Grey Ware on the site.

The objects themselves display a large miscellany comprising adzes, daggers, hoes, arrow-heads and spear-heads, with tang, fish-hooks and tongs.

The objects of iron associated with the Painted Grey Ware at Ahichchhatra are of indeterminate shape as are the shapes in Bairat though enormous quantities of slags of iron clearly indicate a local industry at the latter place.

The excavations at Noh have revealed a sequence comparable with that of the Atranjikhera, and iron objects occurred in association with the Painted Grey Ware, at its earliest level and comprised spear-heads and arrow-heads, the latter leaf-shaped and provided with a socketed tang. In this respect the evidence of iron at Noh compares favourably with that at Atranjikhera, and the evolution of the socketed tang presupposes a fairly long apprenticeship in the production of iron.

Though there are two successive stages of life represented on at least two of the sites named above before the appearance of the Painted Grey Ware, there is no evidence of iron in either of them. At the same time, it may be noted that the black-and-red ware or the associated cultural assemblage are different from each other as well as from the chalcolithic.

(ii) *Iron in Association with the Black-and-Red Ware*

In addition to the evidence of the association of the black-and-red ware at Eran, Prakash, Bahal and Nagda, iron objects have been found in association with the black-and-red ware at Nagal,[9] District Broach, Gujarat, Mahishdal, District Birbhum, West Bengal, and Rajghat, District Varanasi, Uttar Pradesh. The evidence at Nagal is clearly no different from that at the other sites mentioned above, being only pre-N.B.P. Ware in sequence, and does not, therefore, prove a prior evolution of iron here in relation to the Painted Grey Ware.

The example of Kausambi, where[10] black-and-red ware and the Painted Grey Ware occur together, along with iron, has been cited as another evidence in support of the theory of a prior evolution of iron along with the black-and-red ware. At Kausambi, apart from the uncertain nature of its Painted Grey Ware, whatever of it is recognizable would represent the last phase

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of its life at Hastinapura, stylistically. This together with the archaeological evidence of the flood-scar at Hastinapura and the *Purāṇic* evidence of the shifting of the capital to Kausambi would point to a rather late date for the Painted Grey Ware here and, therefore, collaterally of the associative black-and-red ware and the iron objects found with them.

The excavations at Mahishdal[11] has indicated the spread of a chalcolithic culture, distinguished for its white painted black-and-red tradition, in the eastern parts of India. This is followed by a period, when the tradition of the pottery continued, but iron made its appearance in diversified forms such as arrow-heads, spear-heads, chisels and nails, besides iron ore and slags indicative of a local industry. The exact chronological position of the iron-bearing levels is yet to be determined.

The evidence at Chirand[12] in District Saran is similar to that at Mahishdal, namely, iron is seen as associated with the second phase of the chalcolithic culture here, though in keeping with the evidence in western India, it occurred below the deposits of the N.B.P. Ware. This evidence is also comparable to that from Nagda, Eran, Bahal and Prakash.

In this context it has to be borne in mind that there is a cultural deposit characterized by white painted black-and-red ware, below the deposits of the N.B.P. Ware at Sohagaura[13] in District Gorakhpur, Uttar Pradesh, but unassociated with iron. Likewise there is a black-and-red ware deposit without iron below the N.B.P. Ware at Sonpur, District Gaya, Bihar.

The excavations at Rajghat,[14] District Varanasi, Uttar Pradesh, over a number of years have established that the Painted Grey Ware did not appear in this region but the earliest Period (IA) was marked by a variety of the ceramic assemblage consisting of the plain black-and-red ware, black-slipped ware, red-slipped ware and a coarse red ware of black gritty core, besides some iron objects. The occupational deposit of Period IA is only 80 cm. thick, but the next succeeding cultural level, called Period IB, is distinguished by the presence of the N.B.P. Ware, besides the continuance of the ceramic tradition of the earlier Period. At the same time some plain grey ware sherds, of the Painted Grey Ware fabric, were also found along with the N.B.P. Ware sherds.

(iii) *Iron in Association with the Megaliths*

Though iron has been found invariably associated with the megalithic monuments so far excavated in the southern peninsula, it is interesting to note that in the megaliths at Hathinia Pahar[15] and Kotia[16] in the Varanasi and Allahabad Districts of Uttar Pradesh microlithic and Iron Age assemblages, respectively

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have been found, pointing possibly to an evolutional trend from the chalcolithic to the Iron Age, and from the north-east towards the south (see also pp. 54-55).

The iron objects from the megaliths of Kotia comprise spear-heads, sickles, arrow-heads and adzes. They are found associated with the black-and-red ware pottery. This assemblage points to a mixed economy of hunting and agriculture, besides, perhaps, large operations of splitting wood, after the preliminary felling of trees; and the developed miscellany at Kotia point to an earlier beginning of the industry in point of chronology. At the same time the assemblage of iron objects is accompanied, significantly, by a black-and-red ware, besides a red ware and a dull-black or grey ware of thick fabric.

In this context it may simply be mentioned that the megaliths excavated at Banimilia-Bahera[17] in the Jangal Mahal area in the adjoining District of Mirzapur should, in view of the types of the tombs and the ceramic equipment comprising the (i) black-slipped, (ii) red-slipped and (iii) black-and-red wares, belong to the Iron Age, though no iron has so far been found. The presence of the black-and-red ware pottery is common to all the three groups of megaliths in this area, and some in the Hathinia group have been found by the excavator to be comparable with those from the chalcolithic cultures of western and central India, northern Deccan and Rajasthan respectively.

In regard to the megaliths in the eastern Districts of Uttar Pradesh, it may be pointed out that the inferences outlined above are purely tentative, since the evidence presently at hand is far too meagre to warrant broad generalization.

The principal new evidences of iron objects from the megalithic monuments of peninsular India have come from the following sites, viz., Nagarjunakonda,[18] District Guntur, Yelleswaram,[19] District Nalgonda, and Pochampad,[20] District Adilabad in Andhra Pradesh, T. Narsipur,[21] District Mysore, Hallur,[22] District Dharwar, and Sanganakallu,[23] District Bellary in Mysore State, and Kunnattur[24] District Chingleput and Paiyampalli,[25] District North Arcot in Madras State.

The objects worthy of note comprise daggers (tanged) and javelins from Nagarjunakonda; sickles, daggers, swords, lances and javelins from Yelleswaram; sickles, adzes with cross-straps (recalling specimens found at places as far part as Adichanallur, District Tirunelveli in Madras, and Junapani, District Nagpur in Maharashtra), daggers with copper hilts from Pochampad; daggers from T. Narsipur, arrow-heads and spear-heads from Hallur; coiled bracelets from Kunnattur and knives, sickles and nails from Paiyampalli, respectively.

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It may be stated in retrospect, that these do not represent any new types of objects, and are characteristic of the entire miscellany and would emphasize the homogeneity of a well-developed Iron Age culture throughout the peninsula.

As to the chronological position it may be stated that the evidence invariably points to a stratigraphic link with the latter phases of the neolithic-chalcolithic culture of the Deccan, as observed at Brahmagiri, T. Narsipur, Sanganakallu, Tekkalkota, Hallur and Maski in Mysore and Paiyampalli in District North Arcot in Madras State. In this context the evidence of contacts between the chalcolithic cultures of central India at Bahal-Tekwada and Ranjala,[26] District Dhulia, Maharashtra may be pointed out. The concentration of the sites with such clear evidences of stratigraphical and cultural overlap between the megaliths and the neolithic-chalcolithic culture, on the one hand, and the chalcolithic cultures of central India and northern Deccan on the other, shows the crucial area, where the commingling should have taken place. This would also go against the idea of a more southerly focus, such as Adichanallur, being the original evolution area of the megaliths in the peninsula, advocated in some quarters, on the twin grounds of the absence of the megalithic bounding circle and the presence of the white painted design[27] on the typical pottery, respectively, making the involved culture implicitly nearer to the chalcolithic cultures in this supposed area of their contact in the past. It may be pointed out that the tradition of painting in white on black or black-and-red ware pottery has spread far and wide and has been seen at Tirukkallupatti[28], in Madurai, and further north at Hallur in Dharwar as well as variously in the earlier chalcolithic cultures. The absence of the bounding circle is not the monopoly of Adichanallur, since there are ample evidences further north as in the case of the barrows in District Chingleput. The homogeneity of the cultural components on the contrary has been further brought out by the author's excavations at Amirthamangalam.[29] Added to all this is the present lack of evidence of a pre-iron megalithic *ensemble* in the south, contrasting with the evidence of megaliths without iron and little of the black-and-red ware, in association with microliths, in District Varanasi and iron-bearing megaliths with the black-and-red ware in District Allahabad both in Uttar Pradesh in the north Indian plains.

(iv) *Iron in the Asura Sites of Chhota Nagpur*

The position of the legendary or so-called Asura folk in the development of iron technology in middle eastern India has been discussed at some length above (pp. 183-86). Recently a habita-

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tion site and a burial site, respectively, attributed by tradition to the Asuras were excavated by S. C. Ray, at Saradkel, 50 km, from Ranchi and at Khuntitoli,[30] 35 km. from Ranchi; both in the Khunti subdivision of the Ranchi District in Bihar. While a full-fledged iron smelting factory site with haematitic ores, slags and finished articles of iron showing a multiplicity of uses has been attested, the entire cultural *ensemble* characterized by red ware pots, iron objects, brick-built houses and deep vertical shafts laid into the earth for smelting iron ores (mostly haematite) and now and then a punch-marked coin would not suggest greater antiquity than the 1st-2nd centuries A.D.

The single burial exposed so far is indeed megalithic in structure and appearance, being represented by a large pot surrounded by small pots all in red ware within the pit, covered by a tumulus and marked by a flattish capstone erected on small boulders over the central urn laid into a shallow pit. It recalls the *kuḍakallus* of the west coast area of peninsular India. The connexion, if any, between the habitation site and the burials has not yet been established, nor are the contents of the urns fully known yet. Even if the two were established as complementary to each other, the factor of chronological lateness would absolve Saradkel of any responsibility for ushering in the Iron Age in India. It is assumed, for the present, that Saradkel would be representative of the Asura culture in general. Future work on this problem over an extensive scale and area, however, would reveal the true picture in the ultimate analysis.

The repertoire of the iron objects at Saradkel comprised arrowheads of diverse shapes, axes with double or single cutting edges, chisels, sickles, nails, longitudinal ploughshares, door-hinges, rings and knives etc. All these point to a multiplicity of activities such as agriculture, hunting, felling of trees and even engaging in some kind of battle for self defence, if not actual aggression. The last aspect of their activities is also indicated by the remains of brick fortifications around the little township.

It is not possibe to say if the iron smelting Asur (Āsur as labelled by Walter Ruben; see pp. 183-86) tribes today concentrating in the Chhota Nagpur plateau can be traced to these relics. It must, however, be admitted that though the Mundari tradition attributes these remains of both the habitation sites and burials to the Asurs who are believed to have been the earlier dwellers of the soil, from where the Mundas drove them away, the chronological anachronism would stand in the way of the veracity of the Mundari beliefs.

The excavations at Saradkel have also revealed sections of several vertical pits laid into the earth, each about a metre in

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width uniformly, and 2-3 m. in depth. These contain ash and slags etc. and have been described by M. K. Ghosh as smelting furnaces. These present a contrast to the cylindrical or cubical clay-built shafts of the Agarias and other tribal smelters presently in vogue throughout the country (see Chapter 9, pp. 182 ff.). It should clearly have been difficult to operate these shafts, as, presuming that the shafts were alternately charged with beds of charcoal fuel and ores, respectively, in several layers, a suitable flue was provided, while the natural flow of air agitated further by the burning fires created a blast that sustained the burning fuel, the smelters were obliged to burrow into the deep shafts and rummage among the cinders for the coveted bloom of iron.

C. Aryan Problem and Literary Evidence

(i) *Fresh Evidence in West Asia*

Richard Hauschild has considered fresh evidence brought to light in recent years in West Asia and has identified the traces of an older substratum of an Indo-Aryan language[31]. He has gone into the question at length and, having examined the entire evidence, has sustained the view earlier set forth by him,[32] namely, that the linguistic traces have greater affinity with the language of the Vedic literature than with the Iranian, and that the Indo-Aryans had moved away from an yet unknown centre of dispersal. In the course of their movement they had settled first in the southern parts of Russia which became their second home. From there in course of time they moved on to India.

(ii) *Nīlalohita*

The author only tentatively suggested that the reference to *nilalohita*[33] in the *Atharvaveda* was an appellation of earthen vessels, indicating their colour may refer to the Painted Grey Ware (p. 195). Several scholars, including A. Ghosh, pointed out at the Poona Seminar in 1964 that it might at best be translated as black-red or black-and-red but beyond this no positive statement could be made.

It may, however, be stated that translating the word as black-red or black-and-red would present the obvious difficulty of translating *nīla* as black. Monier Williams translates it alternatively as dark blue and red, purple, dark-red or mixture of blue and red in his *Sanskrit-English Dictionary*. The translation closest to the suggested black-and-red is dark blue and red. Even if it were taken to stand for black-and-red and indicate a pottery of that description, it is not to be wondered at, as the black-and-red ware is seen to have occurred in India earlier than the emergence of the Painted Grey Ware, even on the sites where both

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occurred together, and was far more prolific and, therefore commoner than the latter, which was a *de luxe* and occasional ware, was also known to the Aryans. It has been pointed out (pp. 102, 194-5) that the Aryan immigrants could not be expected to bring with them large quantities of pottery and that they adopted the local ceramic wares and adapted them to their diverse uses.

A distinction between the Painted Grey Ware and the other Wares adopted by the Aryans is in the peculiar superiority of the Ware to the every day black-and-red ware or other wares that constituted the ceramic complex. It is not meant, however, to say that the black-and-red ware adopted by the Aryans, and put into vogue thereafter is the same as the one existing before.

In fact the differences are apparent, though the details are yet to be worked out.

D. Radio-Carbon Dates and the Iron Age

(i) *The Harappa Culture*

The inclusive chronological range of the Harappa Culture has been held hitherto as *circa* 2500-1500 B.C. (see p. 81). But the scientific dates offered in recent years by the Carbon-14 analysis of charcoal remains have indicated a date range (fig. 23) of *circa* 2300-1750 B.C.[34] This would perhaps explain the lack of any stratigraphic contact between the Harappans and the Painted Grey Ware-using Aryans, who, as the same Radio-carbon methods of study have shown, cannot be pushed back, in the present state of knowledge, beyond *circa* 1000 B.C. approximately. One cannot often reconcile subjective and deeply entrenched preconceptions about the Aryans destroying the mighty Harappans to objective observations about the lack of contact of the Harappans with those who have now been recognized as the Aryans.

A few years ago, Wheeler[35] had suspected the Aryans to be the destroyers of the Harappans and so this association has stuck. The Carbon-14 dates found so far have clearly indicated a widely gaping disparity in chronology between the end of Harappa and the arrival on the scene of users of the Painted Grey Ware, who are known to have occupied the same area, as Ghosh's explorations of 1951-52 in the Bikaner region have clearly established.

(ii) *The Banas Culture*

As though to fill the interregnum between the Harappans and the users of the P. G. Ware in time and space, archaeology has revealed a new cultural *ensemble* christened as the Banasian[36],

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in the valley of the Banas in Rajasthan in the well-known sites of Ahar[37] and Gilund[38], both in District Udaipur, which have revealed a chalcolithic culture, dominated by the tradition of the white-painted black-and-red ware in contradistinction with the chalcolithic cultures of western and central India and northern Deccan. Carbon-14 dates have indicated a date range of *circa* 1800—1400 B.C. (fig. 24) for this culture on the basis of the dates obtained from Ahar.[39] Though Sankalia had earlier attributed the chalcolithic cultures of western and central India and northern Deccan in general as the handiwork of earlier bands of Aryans[40], D. P. Agarwal has identified in the Banasians the first group of Aryans[41] who had entered into India. This point was raised by Agrawal in the Poona Seminar of 1964, and it was pointed out by A. Ghosh in response that this old theory of the linguists had been revived by present-day archaeologists hypothetically and he was not so sure of the correctness of the attempted equation.

(iii) *The Painted Grey Ware*

The author had earlier concluded on the basis of the then available evidence that iron was at least as old as 800 B.C. in the Ganga plains if not a little earlier (see pp. 12-34; 230-1). It was, of course, the site of Alamgirpur, which had yielded the evidence of iron in the lowest levels of the Painted Grey Ware in fairly developed form (p. 4, pl. I) pre-supposing an even earlier beginning. But there was no means of arriving at a definite or specific date for its beginning at this site. It was the excavations at Atranjikhera[42] which yielded not merely the most prolific data on the use of iron (pp. 237-40) in the times of the Painted Grey Ware, but the earliest date so far known of the Painted Grey Ware itself along with iron, namely, *circa* 1025 ± 110 B.C.[43] This evidence is, of course, not from the lowest levels of the Painted Grey Ware and, therefore, there is every possibility of the date receding still further in the lowest levels.

The recent analyses of data from the Painted Grey Ware levels have shown an approximate date range of *circa* 1000-500 B.C.[44] for this ware and this is closer to Lal's empirical dating, 1100-800 B.C., for the ware at Hastinapura. With the fading away of the hiatus between the Painted Grey Ware and the N.B.P. Ware, which have been observed to overlap stratigraphically, the above-mentioned chronological scheme in respect of the Painted Grey Ware has come to stay, particularly with the date of the N.B.P. Ware itself being fixed at *circa* 500-200 B.C. on the basis of the few Carbon dates so far obtained. The pattern of cultural sequence in the Ganga plains and its chronology are, therefore,

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fixed tentatively as above, and it may be stated that these new dates do not substantially affect any of the archaeological theories about them or arising out of them or so far propounded before the Carbon-14 dates were known (see also pp. 31-34).

(iv) *Chalcolithic cultures of Western and Central India and Northern Deccan*

The author had earlier stated (see pp. 35-36, 42) that the chalcolithic cultures of western and central India and northern Deccan respectively were post-Harappan in chronology, in view of the general lack of signs of contact between the Harappa culture and the chalcolithic cultures, even though they occupied geographically overlaping areas. Carbon-14 studies have, however, shown a chronological overlap between Harappa and the other chalcolithic cultures. The date range for the chalcolithic culture of western India as exemplified at Ahar (Banasian) is 1800-1400 B.C. The date-scheme for the chalcolithic culture of central India as exemplified at Maheshwar-Navdatoli[45] has been fixed at *circa* 1700-1000 B.C.

But further south, in upper Deccan, the corresponding date scheme for the Deccan chalcolithic has been seen to extend upto *circa* 700 B.C.[46] There are indeed points of contact among them all, though they appear to represent separate cultural groups.

So far as the Iron Age is concerned, it is observed that the Deccan chalcolithic culture affects the southern megalithic culture through several points of close contact or a chronological overlap in the form of common shapes of pots in the black-and-red ware, the graffiti marks, and even the incorporation of the urn and extended burials as seen at Bahal-Tekwada or Ranjala. This cultural interlock would point to a chronological overlap, and would help date the beginnings of the iron-using megaliths in peninsular India accordingly i.e., around *circa* 700 B.C. i.e. the date of the terminal phase of the culture as observed in respect of Eran and Nevasa, if not a little earlier. This dating would also affect the terminal phase of the chronology of the neolithic-chalcolithic culture of southern Deccan since it overlaps with the early phase of the megalithic culture of several sites (p. 220). All this would indicate that the Iron Age in India was ushered into south India later than in the Ganga plains.

E. The Black-and-red Wares and the Iron Age

(i) *General*

The black-and-red wares in their diverse forms and ramifications pose a major problem in Indian arcnaeology in regard to the

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assessment of their antecedents, the folks with whom or the cultures with which they are associated, their mutual relationships and of course the time factor. In recent times some writers have spoken of the black-and-red ware, in the singular, claiming that it is (i) homogeneous wherever it occurs, (ii) unitary, owing itself to a common folk, and that (iii) the concerned folks were responsible for the introduction of iron both in the Ganga plains and in the megaliths of peninsular India. The black-and-red ware and all that went with it including iron and the megaliths of south India, have also been attributed to a common folk, the Dravidians. According to this theory the black-and-red ware folk, moved from its ancestral focus in Rajasthan, in the Banas valley, first eastwards where they picked up iron evolving the technology by using the ores available in the region of Bihar. Later they spread southwards picking up the megalithic cult and introduced the iron technology in the background of extensive deposits of iron ores in the peninsula. At the same time it is pointed out that the megalithic structure evolved later than the urn-burials such as those at Adichanallur without the megalithic appendage of the bounding circle, and the fusion of the burial mode with the megalithic architecture took place in the western part of the lower Deccan.

This point of view[47] relates broadly to (a) the homogeneity of the black-and-red ware ceramic and commonness of the folk who used it, and that (b) they were Dravidians, who moved first to eastern India, adopting iron there, and again to the south, where they introduced the megalithic culture. Some of these different aspects are discussed below. Some, such as the process of the evolution of iron and the absorption of the megalithic cult, have been dealt with in detail before (pp. 55-66).

(ii) *Was the Black-and-Red Ware a homogeneous Ceramic?*

It is often thought that the black-and-red ware represents a homogeneous ceramic, and can be traced to a single ancestral source and represents a particular people, and the bias is in favour of the Dravidians.

A few objections may be raised against this facile theory, which was first set forth by the late B. Subbarao[48] (see pp. 171-72).

The concession that the problem of the black-and-red ware culture in India is unitary in nature amounts to begging the question. Apart from the basic divergence of shape and fabrics of the ware, in different regions and chronological levels, which again have not been fully worked upon, it should be emphasized that pottery alone does not form a culture. The other concomitant

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elements in different climes and times have not yet been assessed and it is obvious that they cannot be uniform. It would be premature, therefore, to speak in terms of a single black-and-red ware culture or a single folk being responsible for the varied cultural patterns represented by it.

That the black-and-red wares are the result of a technique of firing, even as the red ware, and that there are differences in respect of such wares in India were pointed out by the author as far back as 1954[49]. To quote Subbarao[50], "We are no longer justified in making a distinction between the megalithic and non-megalithic wares. The recent discovery of a large number of painted black-and-red ware vessels decorated with dots (as at Navdatoli) at Adichanallur in the Tinnevelly District should set at rest this doubt about the homogeneity." He also demonstrated certain striking similarities between the black-and-red ware of the megaliths and the black-and-red wares of the chalcolithic cultures. Regardless of these similarities between the wares at Tekwada and elsewhere of the chalcolithic culture, on the one hand, and the megalithic, on the other, being the result of a later cultural fusion, the position indicated above by the author holds good till to-day. This was the consensus of opinion at the Poona Seminar on Prehistory and Protohistory. The position may be summed up by quoting Sankalia,[51] who says, "we cannot say that this pottery went from the west to east and north to south; or the process was in a reserve direction, but it is a very interesting phenomenon and needs to be examined very, very carefully, before some deductions are made regarding its movement....."

"The black-and-red ware problem is not a simple problem of superficially comparing the types and fabrics from different places. One has got to examine the pottery from various areas, very scientifically in the laboratory and to say whether the processes in detail are identical or do they differ in important matters."

At any rate, even if it should ultimately turn out that all black-and-red wares are homogeneous, and have, therefore, to be traced to a single people, which is extremely dubious, on the present showing, the stage is premature to say so, and, at the present moment, more assumptive than objective. Meanwhile the obvious differences among the black-and-red ware complexes may be taken into account, if not emphasized.

(iii) *The Black-and-Red Ware and the Dravidians*

It was Haimendorf who had first made the proposition that the megalith-builders of south India were Dravidian speakers.[52]

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This position has been vindicated.[53] Following the premise of the homogeneity of the black-and-red ware, and the fact that it is the distinctive ceramic type of the megaliths, Subbarao[54] was led on to the inescapable inference that the black-and-red ware was a Dravidian ceramic.

The sheer force of the logic of the premise, viz., (i) black-and-red users=megalith-builders and (ii) megalith-builders=Dravidians, led him on to the inevitable conclusion, viz., the users of the black-and-red ware, as found at Ahar and Gilund both in District Udaipur, Rajasthan, characterizing the Banas culture as distinguished from the chalcolithic cultures of Gujarat and Malwa, were Dravidians. They should, therefore, have appeared on this subcontinent some time about 2000 B.C., though the C.-14 dates have not yet shown an earlier date than 1800 B.C., as at Ahar, but before the earliest levels of Navdatoli, *circa* 1700 B.C., and occupied, geographically, dissociated areas, which were simultaneously inhabited by the Harappans as well.

In Bikaner, the Painted Grey Ware (ascribed tentatively to the Aryans) and a plain variety of the black-and-red ware (now ascribed to the Dravidians) occur together.[55] This would constitute the archaeological evidence of the presumed co-existence for a while of the Dravidians and Aryans in the preliminary habitat of the Aryans in India. From there, according to Subbarao, the Dravidians should have moved eastwards and southwards and put an end to or succeeded the chalcolithic cultures, having in the mean-time imbibed both iron and the megalithic cult, and ultimately established themselves in the south, about 500 B.C.

This theory of Subbarao again is based on a distinction between the so-called Dravidian black-and-red ware (i.e. of the so-called Banas culture) and the chalcolithic black-and-red ware, which is a fact and, therefore, goes against the very basic premise of the theory of a homogeneity in the black-and-red ware ceramic. The supposed homogeneity of the black-and-red ware culture itself is thus far from being established.

With the basic premise thus afflicted, the course of logic ought to do the rest to the edifice of the theory based on such as yet-unsure grounds.

The central part of Subbarao's thesis about the movement of the Dravidians from their original habitat to south India and the acquisition of iron and the megalithic cult in the south about the middle of the first millennium B.C. has to be proved to be established convincingly.

The latest addition to the galaxy of theorists of the equation, i.e. black-and-red ware users=Dravidians=megalith-builders, is

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Kamil Zvelebil of Czechoslovakia. In a recent writing[55a] he brings forth the points mentioned below as the mainstay of his thesis, which is based primarily on the similarity of the Harappan symbols of writing to the graffiti marks on the megalithic black-and-red ware pottery, to the extent of 89% of common symbols[56b] prevailing over such a large area and bridging the vast expanse of time that separates the two otherwise exclusive and isolated cultural complexes. Secondly, by the argument that the Dravidians imposed loan words to the oldest strata of the *Ṛig-veda* and imparted to the alphabet its cerebrals (pp. 62-63) he infers that they must have lived along with the Aryans in the north-western parts of the subcontinent between *circa* 1200 and 800 B.C. Thirdly, the fact that the Brahmi script, the earliest specimens of which in south India go back to the 3rd-2nd century B.C. and occur in the rock caves, is itself derivable from the Harappan script points to an unmistakable contact between the two people, maybe, in the distant and as yet unpierced past.

The main points of Zvelebil's observations are as follows:

(a) The Proto-Dravidians lived somewhere between Nubia and Iran from where they migrated into the Indo-Pakistan subcontinent either before the development of the Harappan civilization, or together with its mature phase, and thereafter gradually spread out into the rest of India.

(b) The Dravidians lived together with the Harappans, used the painted black-and-red ware pottery (obviously of the Banas valley), and became acquainted with the Harappan symbols of writing, which they may have also used. Between 1200 and 800 B.C. they appear to have lived with the Aryans (probably represented by the users of the Painted Grey Ware).

(c) They were, therefore, the predecessors of the plain black-and-red ware making Dravidians, who later developed into the iron-using megalithic people.

(d) They had moved away from the primary habitat lying alongside that of the Harappans, between 1200 and 800 B.C., towards the east and south-east and adopted the iron metallurgy in central India in the region of Bihar, on the supposition that the metallurgy of iron evolved independently in this region in India, or, alternatively, in the south about the middle of the first millennium B.C. or about 300 B.C., the so-called *terminus ad quem* of megalithic chronology.

(e) They picked up the practice of burials from the Harappans or the Deccan neolithic people, and the megalithic architecture from some contact with the Mediterranean region.

Howsoever interesting and persuasive Zvelebil's findings, they do not commend themselves to ready acceptance. It is perhaps

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not difficult to see in the megalith-builders the Dravidian speakers of old, but to trace them to the Harappan zone, and to identify them with the users of a black-and-red ware that did not exist (!) is not easy to comprehend. It may be recalled that almost the entire gamut of Harappan life is without any evidence of a black-and-red ware, save for the limited evidence at Lothal[57], Rangpur[58] and Rojadi[59]. To attribute the white-painted black-and-red ware of the Banas valley to the Dravidian ancestors would perhaps be more difficult to sustain than the statement that the users of this variety of painted black-on-red ware lived together with the Harappans, and shared their experience of not merely the symbols, but, inferably and inescapably, also the multitudinous other aspects of their variegated material life, for the evidence of the Banas culture within the Harappan miscellany has not yet come to light nor the Harappan within the Banasian.

Culturally again the Dravidians cannot be isolated as a distinctive element at this time, or at any time until actually the megalithic period, to be exact.

As to the date of the white-painted black-and-red ware in the Banas valley, Carbon-14 data have taken us as far back as 1800 B.C. at the earliest, and evidence for at least five centuries of prior existence of the Banas people has yet to be found to make these supposed Dravidians coeval with the Harappans, and a still longer span to show them as having arrived still earlier.

The elusive land serving as the supposed spring-board of the Proto-Dravidians anywhere in the undefined stretch between Nubia and Iran is yet to be found and named, though there cannot be any doubt that such an evidence may eventually be found some day.

In the Bikaner region A. Ghosh found in his small-scale excavation co-occurrence of the plain black-and-red ware and the Painted Grey Ware, but never the painted variety of the black-and-red ware. If the painted black-and-red ware is to be attributed to the Dravidians, this evidence cannot be used as a proof of the co-existence of the Dravidians and the Aryans until quite a later date. It is interesting, however, to record the co-existence of the plain black-and-red ware and the Painted Grey Ware in the very land of the Sarasvatī-Dṛishadvatī, the early home of the Aryans, from the very beginning since it must have taken some time for this change from the ornate to the simple to have taken place.

Against this background the island-like occurrences of the white-painted black-and-red ware in a chalcolithic complex across Bihar and West Bengal, namely, at Chirand, Pandu-rajar-dhibi, Mahishdal and Nanur, respectively create complications, pointing

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perhaps to forward movements of the users of the white-painted black-and-red ware, while a reversal of the process and a retrogression to the plain black-and-red ware in the very focal region of the culture have to be satisfactorily accounted for. In fact the distributional picture of the painted and plain varieties of the black-and-red ware presents a criss-cross through space and time and one would be tempted, under the circumstances, to call either or both as of Dravidian inspiration. Be that as it may, the genetic connexion between the two basic classifications is not yet easy to see, particularly because there are traces, as at Sonpur and Kausambi, of a rudimentary stage of the black-and-red ware, before it achieved its fineness, pointing to the possible phenomenon of a local development as well.

The theories of the evolution of the iron metallurgy either in central India, or in the south itself, independently of each other, are yet to be proved.

In view of the priority of the earliest iron-bearing strata in the Ganga plains to the earliest levels of the megalithic culture, the striking parallelisms between the megalithic cultures of the two areas and the evidence of a pre-iron megalithic complex in the Ganga plains would tend to show the direction of the trend of cultural movement from the north and north-east to the south, at least in respect of iron.

The priority of the Painted Grey Ware ceramic and the occurrence of the black-and-red ware in the connected miscellany over the megalithic culture would show at least one source of iron in the megaliths. It is likely, as has been pointed out earlier (pp. 65-66), that other strains may also have influenced the megalith-builders, making no difference to the chronological table.

To sum up the position, the users of the black-and-red ware in the megaliths may have been Dravidians, but with which particular culture they may be connected ancestrally is yet to be established. The processes of dispersal of the black-and-red ware cultures, or any pin-pointed culture of the Dravidians, not to speak of the involved time factor, remain to be individualized and explained.

D. The Black-and-Red Ware and the Aryans

D. P. Agrawal[56] has sought to identify the Banasians with the first wave of the Aryans. Certain palpable objections to the theory may at once be raised.

Let the Banasians be Aryans or any other folks, it may be emphasized that they did not certainly constitute an iron-using people, and did not, therefore, have anything to do with the ushering in of the Iron Age in India. It does not, therefore, affect

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the author's conclusions about who introduced iron in India.

Apart from the lack of any valid justification for the theory, it is quite apparent that the Banasians could not have been the destroyers of the Harappans. Chronologically, on the present showing, there is an overlap between the two, yet there is hardly any sign of mutual contact between them, who are, therefore, apparently divergent folks. The dish-on-stand in the black-and-red ware is older in emergence than the Harappa culture, and need not necessarily be traced to the Harappans. The other elements of alleged West Asian affinities have not been established. Above all, it should be borne in mind that in the entire range of the Harappan civilization the black-and-red ware as a ceramic variety, let alone the tradition of white paintings, is almost entirely absent except for the limited evidence at Lothal[57], Rangpur[58], and Rojadi[59], far to the south or south-west of the Banas.

On the evidence of the chronological overlap between the two cultures, it may perhaps be stated, following the reasoning of Agrawal, that the Banasians were responsible for the termination of the Harappan heritage. Among them one must now find the scapegoat of the victors of Harappa. As a logical corollary we should have evidence for an all-India expansion or distribution of the Banasian culture and for the bearers of their tradition in their successors, the users of the Painted Grey Ware, whom scholars now associate, by and large, with the Aryans, thus recognizing a wave of the latter people in later times. Yet and alas, the cultural pattern of these later folk, who spread themselves gradually throughout the Ganga plains, into the land of the *Mahābhārata,* representing the typically Indian culture based on the *Vedic* lore, and merged by degrees into the succeeding phase distinguished by the N. B. P. Ware, and then into the historical period coinciding with the advent of the Buddha, is iron-based and entirely different from the Banasian culture.

One may be tempted to raise questions as to the original home of the so-called first band of Aryans who had strayed into India, the course of their movement towards this new country of adoption, and their relationship with the *Vedic* Aryans, particularly because of the evidence of the development of the *Vedic* pantheon at least as early as the 16th century B.C. among the Mitannis of upper Iraq (pp. 121-25), not to speak of their dubious relationship with the Harappans themselves, whom they are supposed to have destroyed.

It would be hazardous, even if it were possible, in the present state of knowledge, to firmly identify the Banasians and to call them Aryans, when equally strongly others are calling them Dravidians.

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It has been pointed out that the users of the Painted Grey Ware adopted the existing ceramics and adapted them to their needs and thus made them their own. While the Painted Grey Ware was an occasional, *de luxe* ware, nurtured with care, the others, including the plain black-and-red ware, went into their daily lives, and even from the beginning of their life in the country, in Bikaner, in Bharatpur, or in Uttar Pradesh, they used a black-and-red ware, and in that sense they also became a black-and-red ware using people. This was the connexion between the black-and-red ware and the Aryans of the valleys of the Sarasvatī and Dṛishadvatī as well as of the Ganga plains.

E. Conclusion

In retrospect, at the risk of reiteration, it may be concluded that the users of the *de luxe* Painted Grey Ware ceramic, who have been provisionally identified with the Aryans and who imbibed and adapted several other ceramic traditions then extant in the country, including a plain variety of the widespread black-and-red ware, were responsible for the introduction of the Iron Age in India about 1000 B.C. in the northern plains and may have transmitted it by degrees to south India as well through the megalithic folks a little later.

NOTES AND REFERENCES

1. Apart from the study of Lallanji Gopal (see footnote 1 on page 162), no large or substantial work on the subject has been attempted so far. See also *Journal of the Oriental Institute*, Baroda, Vol. XIII, June 1964, No. 4, pp. 349-357 in which the beginning of the Iron Age has been set down at 700 B.C.

2. *Indian Prehistory: 1964*, Poona, 1965, pp. 177-218.

3. Information from Shri R. C. Gaur, *I.A.*, 1960-61, p. 35; 1962-63, Section I (unpublished) and 1964-65, Section I (unpublished). Here the sequence begins with the ochre coloured pottery with little similarity with Harappa, and is followed in succession by a chalcolithic, the Painted Grey Ware and the N.B.P. Ware cultures, respectively.

4. *I.A.*, 1963-64, Section I. The site was excavated by the author in two successive seasons, in 1964 and 1965, respectively. The stratigraphic sequence in the rather limited excavations of 64-65, shows the occurrence of the ochre coloured ware in a silty deposit below the Painted Grey Ware, and the latter overlapped with the N.B.P. in the upper levels. See also *I.A.*, 1964-65, Section I.

5. *I.A.*, 1962-63, Section I.

5. *I.A.*, 1962-63, Section I (unpublished).

6. *I.A.*, 1963-64, Section I, 1964-65, Section I.

7. Information from Shri B. B. Lal.

8. Information from Shri B. B. Lal.

9. *I.A.*, 1961-62, p. 11-12. The evidence at Nagal showed the existence of a single cultural complex distinguished by a black-and-red, with objects of copper and bone points, together with a silver punch-marked coin in the lowest phase.

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Though divided by the excavator into three phases, it is only in the second and third phases that iron objects have been found. At the same time it is to be noted that this cultural complex lacks the variety and richness of the chalcolithic cultures, being, therefore, apparently of a post-chalcolithic horizon. The iron objects themselves are late in emergence on the site as at Maheshwar.

10. G. R. Sharma, *Excavations at Kausambi*, 1957-59, Allahabad, 1960, pp. 18, 19, 31, 39, 57, 59, 68. It is interesting to note that the black-and-red ware was found on the site in Period I, prior to the emergence of the Painted Grey Ware in Period II. The earliest remains of the black-and-red ware in Period I are fragmentary and coarse, but its quality improves in Period II, wherein it is coeval with the Painted Grey Ware. To quote Sharma (p. 18) "but the characteristic feature of the pottery of the second period is the predominance of the Black-and-Red Ware, which as available at Kausambi, represents a comparatively late and decadent stage of the Painted Grey Ware of the upper Gangetic Valley, the Panjab and Rajasthan." In regard to its association with iron, the excavator says (p. 58), "there is definite indication of the existence and use of iron in the later stages of this ware at Kausambi." As regards the iron objects themselves (p. 45), it was observed, "It is noteworthy that small fragments and shapeless bits of iron were discovered as early as SP. I. 3. Objects of distinctive shapes, however, occurred from SP. II. 5 and continued to be used throughout Cultural Period II, but became much more numerous with the beginning of Cultural Period III or the period of the N.B.P. Ware." Broadly speaking the above-mentioned observation is entirely in keeping with the evidence throughout the Ganga plains. There is similar evidence at Rupar.

11. *I.A.*, 1963-64, Section I. It may be noted that while Mahishdal revealed a painted black-and-red ware, and other ceramic wares, microliths and a copper celt, pottery of similar type was the only find of the extremely limited excavation at Nanur. At the same time the chalcolithic cultural complex at Mahishdal was followed by a phase bearing deposits of iron.

12. *I.A.*, 1962-63 and 1963-64, Section I. Chirand shows a chalcolithic culture at its lowest levels, characterized by white-painted black-and-red ware, microliths and a little copper. In its upper phase, it shows the appearance of iron, before the next succeeding period of the N.B.P. Ware and the associated cultural milieu. It is to be noted that the black-and-red ware of the previous period continued throughout the lifetime of the N.B.P. Ware alongside.

13. *I.A.*, 1961-62, 56. The evidence at Sohagaura shows the presence of a plain black-and-red ware along with a plain and painted grey ware, besides other wares, below the deposits of the N.B.P. Ware, but without any trace of iron.

14. *I.A.*, 1957-58; p. 50; 1960-61, p. 35; 1961-62, pp. 57-59; 1962-63, Section I; 1963-64, Section I. Prahladpur in District Varanasi has yielded a supporting evidence.

15. *I.A.*, 1963-64, Section I.

16. *Ibid.*, Section I.

17. *Ibid.*, 1962-63, Section I.

18. *Ibid.*, 1958-59; p. 6, 1959-60, p. 7.

19. *Ibid.*, 1964-65, Section I.

20. *Ibid.*, 1963-64; 1964-65, Section I.

21. *Ibid.*, 1958-59, p. 33.

22. *Ibid.*, *1964-65*, Section I.

23. *Ibid.*

24. *Ibid.*

25. *Ibid.*

26. *Ibid.*, *1960-61*, p. 26.

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27. B. Subbarao, *Personality of India*, cf. fig. 43; The Megalithic Problem of South India and the Dravidian Languages, *Silver Jubilee Volume, Transactions of the Archaeological Society of South India*, Madras, 1962, p. 20.

28. *I.A.*, 1960-61, p. 18.

29. *Ibid.*, *1954-55*, 21-22; N. R. Banerjee, The Megalithic Problem of Chingleput in the light of recent Exploration, *A.I.*, no. 12, pp. 21-34.

30. Information from Dr. S. C. Ray, who carried out the excavations. The point about the vertical shafts seen in the exposed sections being furnaces for smelting of iron ores arose out of the suggestion of Shri M. K. Ghosh, a former M.P., and now resident in Jamshedpur. Also see *I.A.*, 1964-65, Section I. The author himself visited the excavations at Saradkel and made his own observations.

31. Richard Hauschild, Ueber die Fruehesten Arier im Alten Orient, *Berichte ueber die Verhandlungen der sacschischen Akademie der Wissenschaften zu Leipzig*, Vol. 106, no. 6, Berlin, 1962.

32. Richard Hauschild, *Handbuch des Sanskrit*: (Revised Edition), 1960.

33. *Atharvaveda* IV, 17, 4 carries the following passage:

Yaṁ te chakrurāme pātre yaṁ chakrurnīlalohite
Āme maṁse krityaṁ yaṁ chakrustayā kṛityakṛito jahi

It refers to unburnt vessels called *āma* and burnt vessels as *nīlalohita*, as interpreted by H. Zimmer, in *Altindisches Leben*, 1889, p. 253. There cannot be any doubt that it was mentioned in the context of preparation of medicines for witchcraft in vessels *(pātre)* which are of two kinds, namely, (i) *āma* and (ii) *nīlalohit* ङ respectively. In fact, one would be tempted to interpret *āma* as a prototype of the Painted Grey Ware, which looks raw and like something not burnt, greyish, and the other may, in this context, stand for the well-burnt black-and-red ware. The points are not, however, pressed.

34. D. P. Agrawal in Harappa culture: new Evidence for a shorter Chronology, *Science*, Vol. 143, no. 3609, pp. 950-52, suggests a date range of *circa* 2300-1750 B.C. A. Ghosh in his paper on the Indus Civilization, its Origins: Authors, Extent and Chronology, *Indian Prehistory*: *1964*, pp. 113-56, suggests *circa* 2500-1700 B.C. as the inclusive date range. See also D. Lal, The Cultural Pattern of Ancient India, *Sunday Standard*, Madras, 2nd Aug. 1964. I am grateful to D. P. Agrawal for permission to reproduce the Carbon-14 timetables, illustrated in figs. 23 and 24.

35. R.E.M. Wheeler, Harappa 1946, *A.I.*, no. 3 pp. 81-83.

36. Sankalia, Beginning of Civilization in Rajasthan, *Second Seminar on the History of Rajasthan, History Association, M.B. College*, 1962, Udaipur, pp. 1-16.

37. *I.A.*, 1961-62, pp. 45, 150.

38. *Ibid.*, 1959-60, pp. 41-46.

39. B. B. Lal, A Picture Emerges: an assessment of the Carbon-14 datings of the protohistoric cultures of the Indo-Pakistan subcontinent, *A.I.*, nos. 18 and 19, pp. 208-21.

40 H. D. Sankalia and Others, *Excavations at Maheshwar and Navdatoli 1952-53*, Poona-Baroda, 1958, p. 252; Sankalia, *Illustrated London News*, September 5, 1959: Excavations at Maheshwar and Nevasa and their possible bearing on the Puranic History, *Sardha Satabdī Special Volume* of the*J.A.S.B.* (New Series), Vols. 31 and 32, pp. 229-239; *Indian Archaeology Today*, 1962, pp. 88, 97. Sankalia has maintained this position in his comments on the author's paper on the Iron Age in India at the Poona Seminar (see *Indian Prehistory: 1964*, p. 209)

41. D. P. Agrawal first expressed his views on these lines at the Poona Seminar (see *Indian Prehistory*: *1964*, p. 200). He has since made a succinct expression of his thought in an article entitled, 'C 14 Dates, Banas Culture and the Aryans' yet

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to be published. It was privately circulated, thanks to the courtesy of D. P. Agrawal himself and A. Ghosh, Director General of Archæology in India.

42. B. B. Lal, *op. cit.*, D. Lal, *op. cit.*

43. T. F. 191 gives the date of this site as 2975 ± 110 = 1025 ± 110 B.C. Also information from Shri R. C. Gaur; B. B. Lal, *op. cit.*

44. D. Lal, *op. cit.*

45. B. B. Lal, *op. cit.*

46. B. B. Lal, *op. cit.*

47. K. V. Soundara Rajan in *Bharatiya Vidya*, Vol. XXIII, no. 1 to 4, pp. 1-21.

48. B. Subbarao, *Personality of India*, second edition, 1958, pp. 117-25; The Megalithic Problem of south India and the Dravidian Languages, *Silver Jubilee Volume, Transactions of the Archaeological Society of South India*, 1963, pp. 132-51.

49. B. Subbarao, *Personality of India*, second edition, 1958, p. 178.

50. Subbarao, The Megalithic Problem of South India and the Dravidian Languages, *op. cit.*, p. 146.

51. H. D. Sankalia, *Prehistory and Protohistory in India*, Bombay, 1962, pp. 281-282.

52. Christoph von Fuerer Haimendorf, in *Indo-Asian Culture*, Vol. II. See also footnote 179 on p. 74 and also pp. 61-63.

53. N. R. Banerjee, Megalith-builders were Dravidian Speakers—A Review, *Silver Jubilee Volume, Transactions of the Archaeological Society of South India*, 1962, pp. 18-89. See also pp. 61-63.

54. B. Subbarao, *op. cit.*

55. Information from Shri A. Ghosh. It is to be noted that a plain black-and-red ware and the Painted Grey Ware occur together in the same stratigraphic context.

55a. Kamil Zvelebil, Harappa and the Dravidian—an old Mystery in a new Light, *New Orient*, Prague, Vol. 4, June 1965, no. 3, pp. 65-69.

55b. B. B. Lal, From the Megalithic to the Harappa: tracing back the graffiti on the pottery, *A.I.*, no. 16, pp. 4-24.

56. D. P. Agrawal, *Indian Prehistory: 1964*, p. 200, 'C 14 Dates, Banas Culture and the Aryans' (in the press).

57. *I.A., 1955-56*, p. 6; S. R. Rao, Excavation at Rangpur and other explorations in Gujarat, *A.I.*, nos. 18 & 19, pp. 61, 82-83. Rao thinks that the black-and-red ware at Lothal is indigenous. *Ibid.*, p. 178.

58. *I.A.*, 1954-55, p. 12; S. R. Rao, *op. cit.*, pp. 61, 82, 83.

59. *I.A.*, 1958-59, p. 21.

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CHAPTER 14

RESUMÉ

In this study of the beginnings of the Iron Age in India and its progress in the early years till it was firmly established, the following inferential points may be emphasized:

(i) The Harappa civilization, which, in spite of some recent claims, is not the handiwork of the Aryans, but of an earlier people, came to an end about 1700 B.C. Suggestions have been made to bring down the date to *circa* 1200 B.C. on scientific grounds.

(ii) The Boghaz Keui inscription, marking the treaty between the Indo-European Hittites and Mitannis and pointing to the development, if only to an extent, of the *Ṛigvedic* way of life at the time, though outside the bounds of India, is dated to 1365 B.C.

(iii) The Mitannis, being a minority in Syria and having sacrificed their language, could not have been the people who were connected with the Aryan immigration into India.

(iv) The Indo-European Hittites were defeated and ousted from their home in Asia Minor (Turkey) by the invading armies of Thraco-Phrygians in *circa* 1190 B.C., setting in motion a colossal exodus of an Indo-European people in all directions with all their arts and sciences.

(v) A new people is seen to occupy parts of the Iranian plateau about this time, i.e. in Sialk VI, or slightly later and introduce iron in the new habitat. These people have been claimed to be Indo-Europeans.

(vi) The great links between Iran and *Vedic* India in language, and in the fundamentals of religion point to a period of co-existence prior to a split over mainly religious concepts.

(vii) Stratigraphically the earliest sizable archaeological remains, after the Harappa civilization, is characterized, almost from the beginnings, by a distinctive ceramic called the Painted Grey Ware, though an overlap between the two is yet to be found. This characteristic has been discovered even in the Bikaner region, watered by the Sarasvatī and Dṛishadvatī and recognized as the early habitat of the Aryan folks. There is, therefore, no difficulty in recognizing the Aryans as the users of the Painted Grey Ware ceramic which they did not possibly bring into India from outside, but had every opportunity to adopt, because of its attractions and superior qualities, from the makers of the

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Shahi-tump cemetery, who seem to have shared, with many other circumscribed tribal groups, in the invasion of India with the Aryans.

(viii) A people using another ceramic type, provisionally and circumstantially called the 'ochre coloured pottery', seems stratigraphically to intervene in the Ganga plains before the beginnings of the Painted Grey Ware. This has been dubiously connected with the innumerable 'copper hoards' found from time to time disjointedly and without stratigraphic contexts in the Ganga plains. While the possibility of their being associated with an indigenous people is strong, their link with the 'ochre coloured pottery' is neither clear nor established. Simultaneously, claims have been raised that the so-called 'ochre coloured pottery' represents the handiwork of Harappan refugees, who fled before the invaders who had destroyed their mighty civilization. The apparently degenerate state of the pottery has possibly to be attributed to centuries of water-logging. This is quite possible. Nevertheless, it would mean some time-lag between the destruction of the Harappa civilization and the advent of the authors of the destruction into the more easterly Ganga plains.

Recent excavations at Atranjikhera in the Ganga plains as well as at Noh in Rajasthan have shown the presence of a culture characterized by a plain black-and-red ware between the 'ochre coloured pottery' and the Painted Grey Ware. The interregnum is also otherwise filled by the chalcolithic cultures dated to *circa* 1800-1000 B.C. The Carbon-14 date for the middle levels of the Painted Grey Ware at Atranjikhera is 1025 ± 110 B.C.

(ix) The date of 1100 B.C. for the commencement of the Aryan culture in the Ganga plains is in this context very nearly upto the mark.

(x) The Aryans would be expected to have knowledge of the use of iron even at this remote date from their contacts with an iron-using folk outside India. This is borne out to a certain extent by the frequent use of the word *ayas* in the *Ṛigveda* as a metal that appears to have covered gold, copper and iron.

(xi) The time-lag to settle down in the new land of their adoption, look for ores and start smelting the new metal and manufacturing objects of utility would not be unreasonably long and a date around 800 B.C. for this phenomenon had been suggested, there being indications of an earlier beginning about 1000 B.C.

The foregoing discussion in the dissertation and the summarization of the main points have sought to establish that it was the Aryan settlers in India, who also used the distinctive Painted Grey Ware ceramic, that were the first to use iron in ancient

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India around 1000 B.C., if not earlier. Around 800 B.C. or slightly earlier, the use of iron is testified among a people who buried fragmentary remains of their dead in cairns in the borders of Iran and Pakistan. It is possible that they obtained their knowledge of iron from Sialk VI in Iran even as the Aryans of the Ganga plains apparently did. A little later iron came into its own in west-central India in the post-chalcolithic phase as also in the megaliths of south India. In both cases the advent of iron is apparently later than its arrival in the Ganga plains, and possibly, on that score, they, especially the megaliths, owe not a little of their metallic inspiration to the northern plains. The possibility of a cultural influence direct from Iran (Sialk VI) being transmitted through the cairn-burials to the megaliths of south India, with substantial traces in the intermediate regions, cannot be ruled out. While Dravidian speakers appear to have taken a special fancy to the megalithic mode of disposal of the dead, considerable numbers of a brachycephalic people, akin to the Sialk VI folk, were present in their midst to accentuate the megalithic order of life.

A relative superiority of the northerly Aryans in arms, more than in numbers, would possibly account for the ultimate confinement of the Dravidian speakers, who had earlier lived in the Indus plains, into peninsular India, and would, by inference, confer on the Aryans the glories of being pioneers in a new metallurgical experience in the new land of their adoption.

Endeavours to associate the Achaemenid Persians, after Darius, with the introduction of iron into India have not found support from archaeological evidence.

As to an indigenous origin, the evidence is too thin as yet, and does not lend itself so far to a stratigraphical correlation with any antecedent or precedent cultural milieu. (See Chapter 13).

The early Iron Age in India, can, therefore, be dated between *circa* 1000 B.C. and 200 B.C., and the prime responsibility for introducing iron in India and spreading it far and wide within the sub-continent can be squarely fixed on the Aryan endeavour.

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APPENDIX

Painted Grey Ware and Northern Black Polished Ware

(i) *General*

The two most distinctive ceramic wares of ancient India, called respectively as the Painted Grey Ware and the Northern Black Polished Ware, have figured considerably in the discussions in the foregoing pages. These are quite familiar terms in India but are not so well known outside. Much has been written about them already, and various facets of these wares have been touched upon in the course of the discussions or in the notes. Nevertheless, it was felt it would be helpful in several ways to treat them separately but briefly only to indicate their main characteristics only.

(ii) *The Painted Grey Ware*

It is a well-burnt and thin grey ware of smooth texture and fine fabric, profusely painted in linear or dotted designs, often in combination, and is widely distributed in the Indo-Pakistan subcontinent. From the evidence so far collected, its distribution spreads from Lakhiyopir in West Pakistan across Bikaner to the Ganga plains (fig. 18) with limited traces further south.[1]

The usual shapes (fig. 19) comprise bowls, cups and dishes and indicate special use as a *de luxe* ware.

It was first observed at Ahichchhatra in District Bareilly, Uttar Pradesh.[2]

As the layer in which this ware occurred at this site contained also a few sherds of the Northern Black Polished Ware, the two wares were considered as coeval, though the possibility of an earlier evolution of the Painted Grey Ware and a later overlap with the Northern Black Polished Ware was clearly recognized. The truth of such an overlap existing between the two wares has been indicated by the evidence from the recent excavations at Sravasti[3] and confirmed by fresh excavations by the author at Ahichchhatra in 1964 and 1965.

The Painted Grey Ware was pursued by B. B. Lal tenaciously and found in a large number of sites in the course of a surface exploration. He then began to think, on the showing of the evidence then in hand, that this ware might be associated with the Aryans. He gave expression to this thought in a paper on the Painted Grey Ware of the Upper Gangetic basin.[4] The excava-

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tions at Hastinapura which followed these explorations supported the inference of Lal a little more strongly.

The description of the details of the Ware can be seen in Lal's publication of the report on the excavations at Hastinapura.[5]

Lal refers in a recent publication to the Carbon-14 data from the upper levels of the Painted Grey Ware culture at the key site, Hastinapura.[6] The dates obtained approximate to 505 ± 130 B.C. to 335 ± 115 B.C. These data no doubt bring down the date-scheme by nearly three centuries. In this context the difficulties of the application of Carbon-14 methods and the uncertainty attached to it can only be emphasized. At the same time it is pointed out that the Hastinapura data seem to have suffered contamination by being mixed with rootlets. More recently the Carbon-14 assessments of the remains from the lower levels of the Painted Grey Ware at Atranjikhera in District Etah, Uttar Pradesh, excavated by the Aligarh Muslim University, have pointed to a date of 1025 ± 110 B.C. for it in association with iron.[7] The chronological extent would thus range from *circa* 1000 B.C. to 450 B.C. or 500 B.C. as is broadly accepted now.

(iii) *The Northern Black Polished Ware*

It is, as its name implies, a black ware of well levigated clay, which is usually grey but sometimes reddish in section, well-burnt, sturdy, with a metallic sound, of smooth texture, and prominently slipped and is brilliantly burnished or polished to the quality of a glaze. The colour of the polish changes occasionally from coaltar black to a steely, silvery or a golden shine or lustre.

The usual shapes (fig. 20) are bowls, dishes, lids and *hāṇḍis* (carinated jars) and indicate special uses.

It is widely distributed (fig. 18) in northern India, hence its name; though it is not a strictly correct assessment as the ware has been observed as far south as Amaravati, Kesarapalli and Chebrolu.[8] It is sometimes decorated with paint or with stamped designs.

It was first described at length in a preliminary and short report on the excavations at Ahichchhatra.[9] The subsequent explorations and excavations have widened the knowledge of the distribution of the ware.

Earlier it was dated to the period between the 5th and the 2nd centuries B.C.[10] Lal endeavoured to date it between *circa* 600 and 200 B.C.[11] The Carbon-14 determination would, however, support a date range of 500-200 B.C., with a period of overlap with the Painted Grey Ware (see also Chapter 13).

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(iv) *Provisional Chronological Conclusions and Archaeological Theories*

While the chronological conclusions on the basis of Carbon-14 determinations are purely provisional as they would be subject to verification with the help of data from a series of sites and through other determinations, it may be pointed out that these do not fundamentally affect the archaeological theories set forth in the preceding pages or otherwise in vogue to-day (see also Chapter 13).

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9. *A.I.*, no. 1, pp. 56-58.
10. *Ibid.*, p. 56.
11. Lal, *A.I.*, nos. 10 & 11, pp. 22-23, 51-52; see also Gordon, *op. cit.*, p. 175 and Wheeler, *op. cit.*, pp. 30-35.

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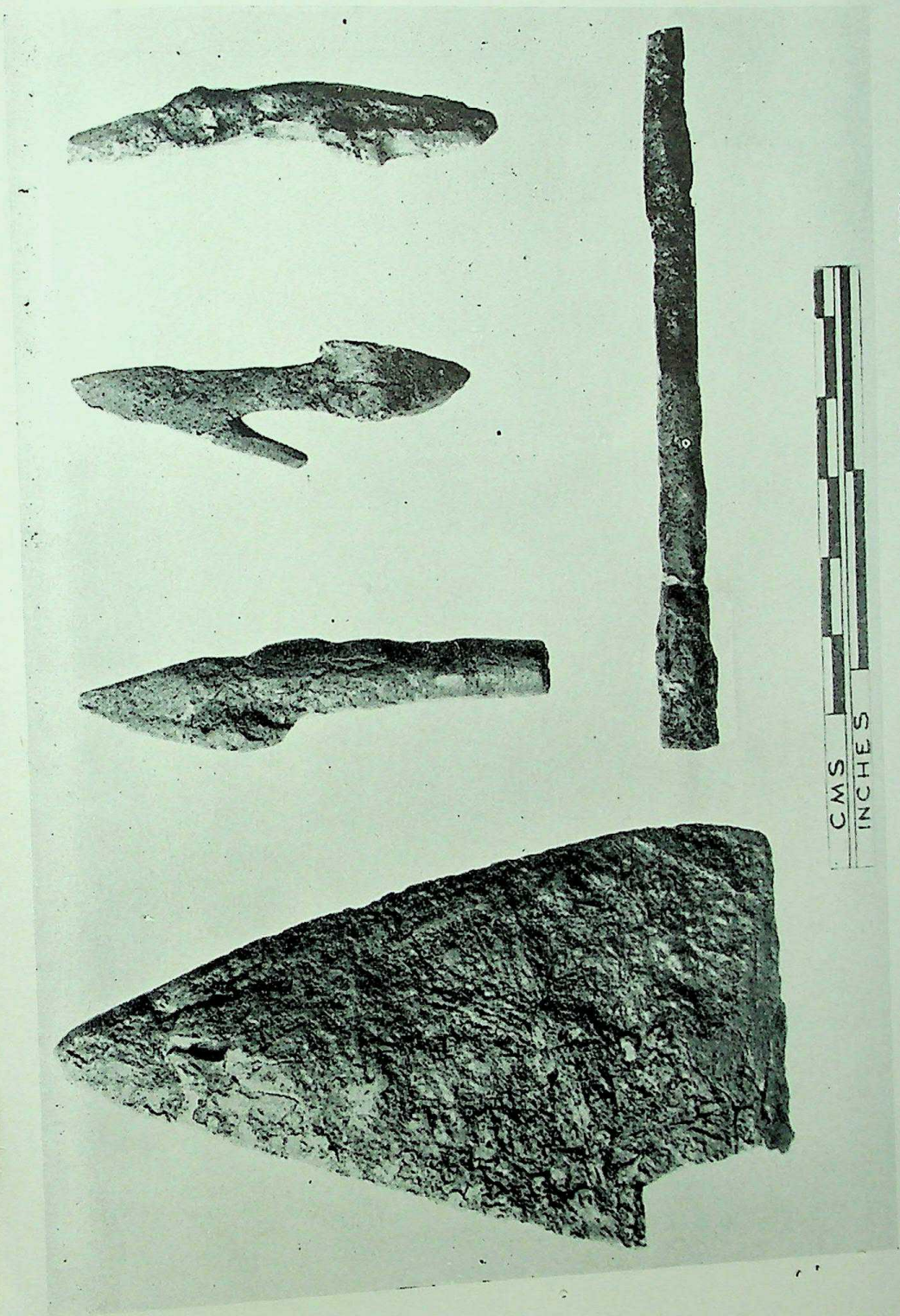

Iron objects from the P. G. Ware levels, Alamgirpur. See pages 4 and 224.

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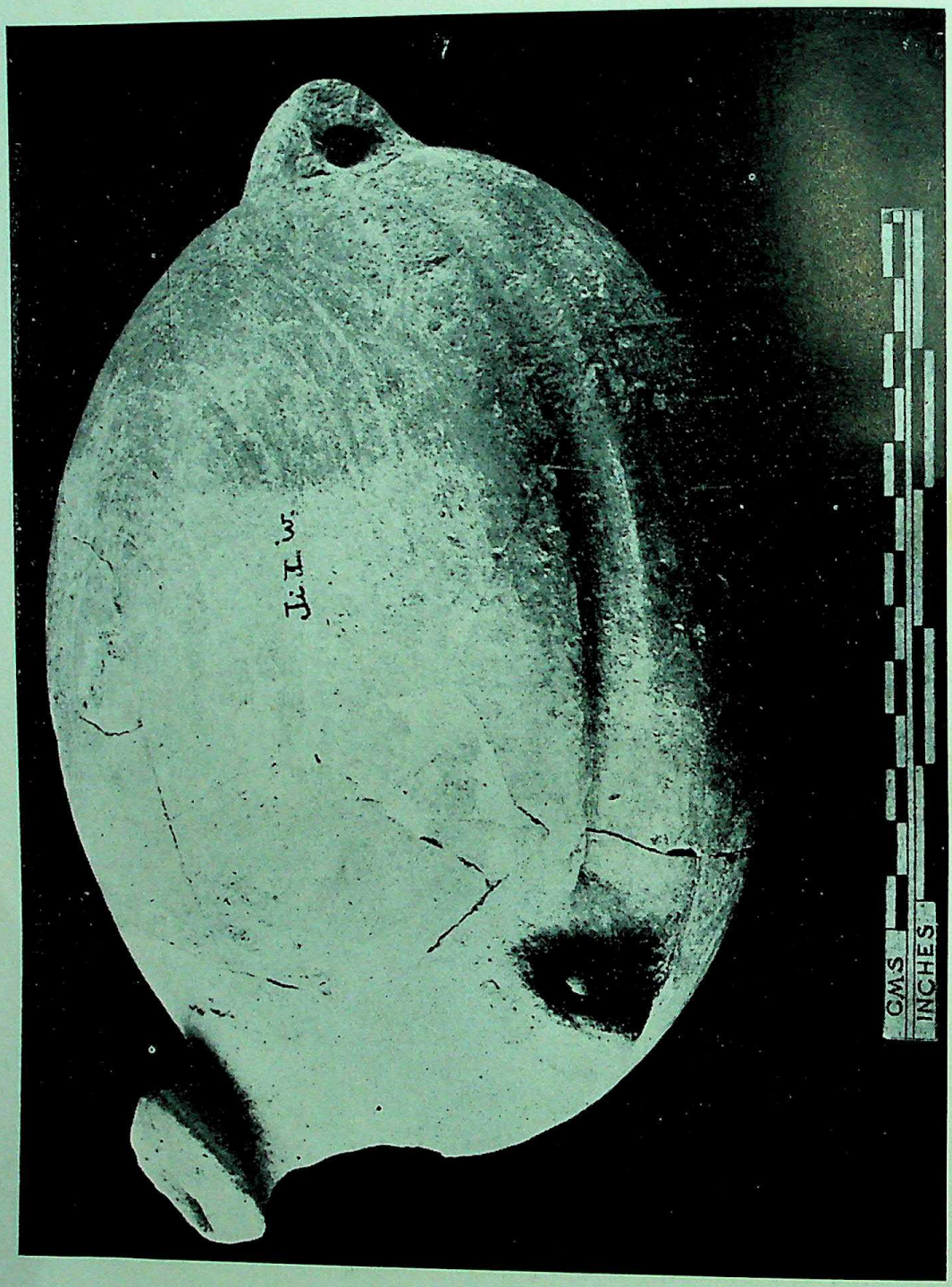

Flattish flask from Jivanri, a cairn-burial site, showing the loops and a groove for the carrying cord. See pages 45 and 128.

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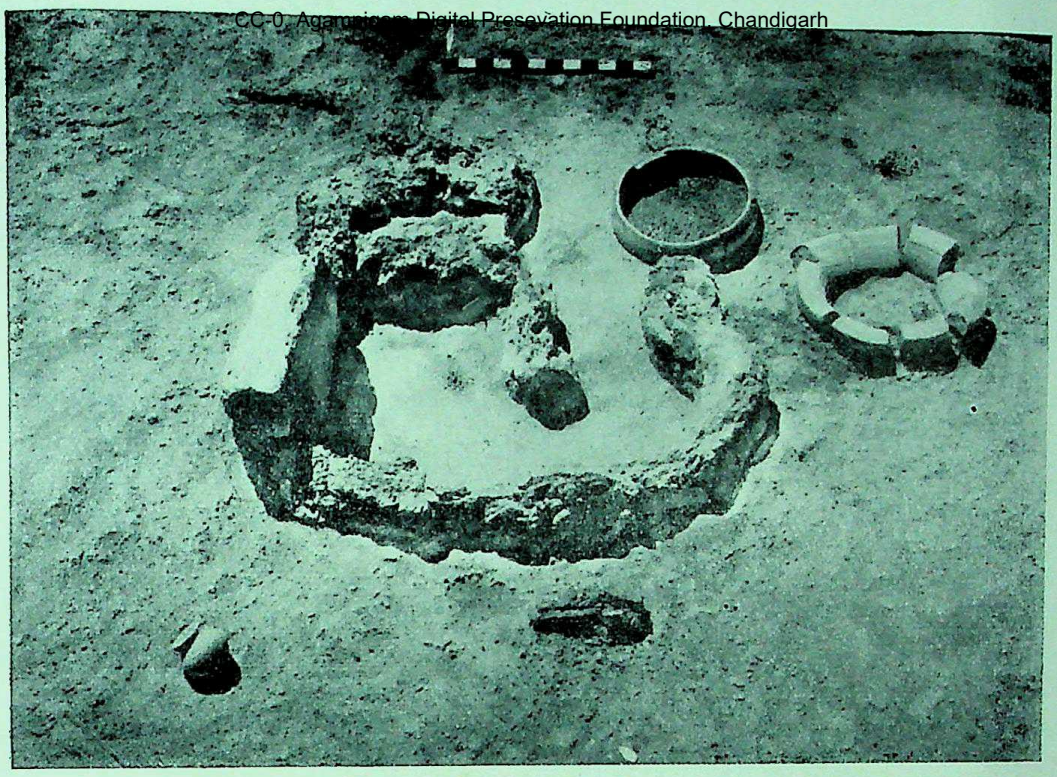

Furnace for the forging of iron objects, in the N. B. P. Ware levels (Period II), Ujjain. See page 179.

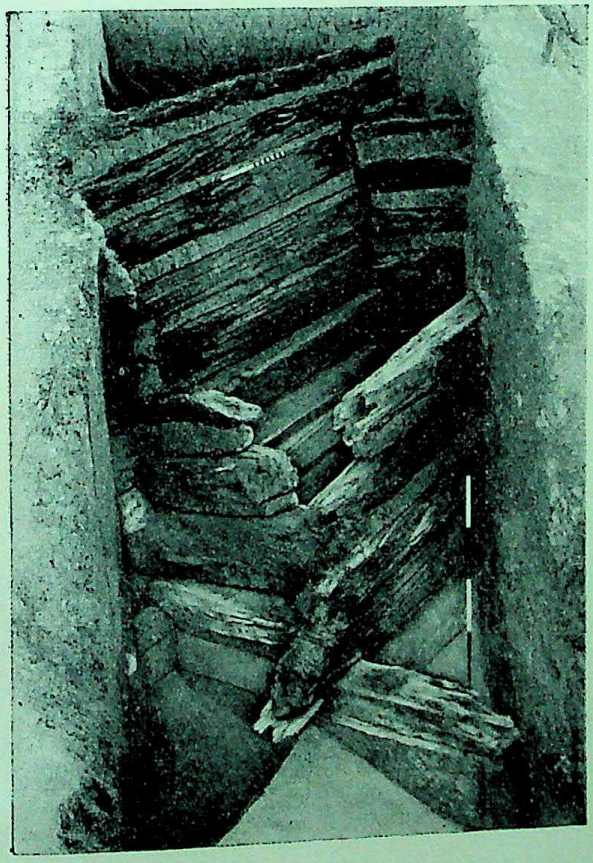

PLATE IV

Wooden reinforcement to mud-fortification in the P. G. Ware levels (Period I), Ujjain. See page 16.

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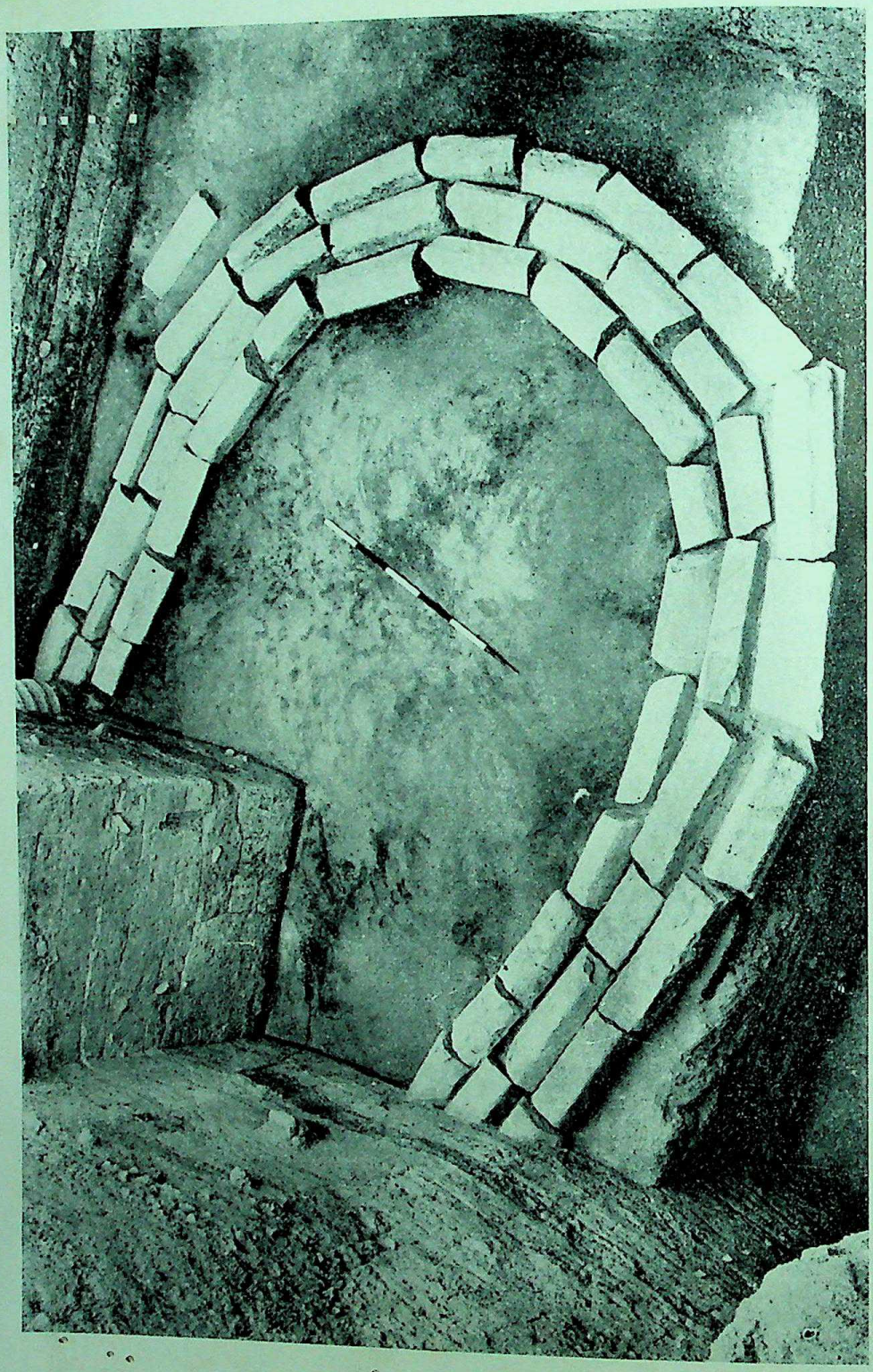

An apsidal structure of dressed stones in the lowest level of the N.B.P. Ware (Period II), from Ujjain. See page 18.

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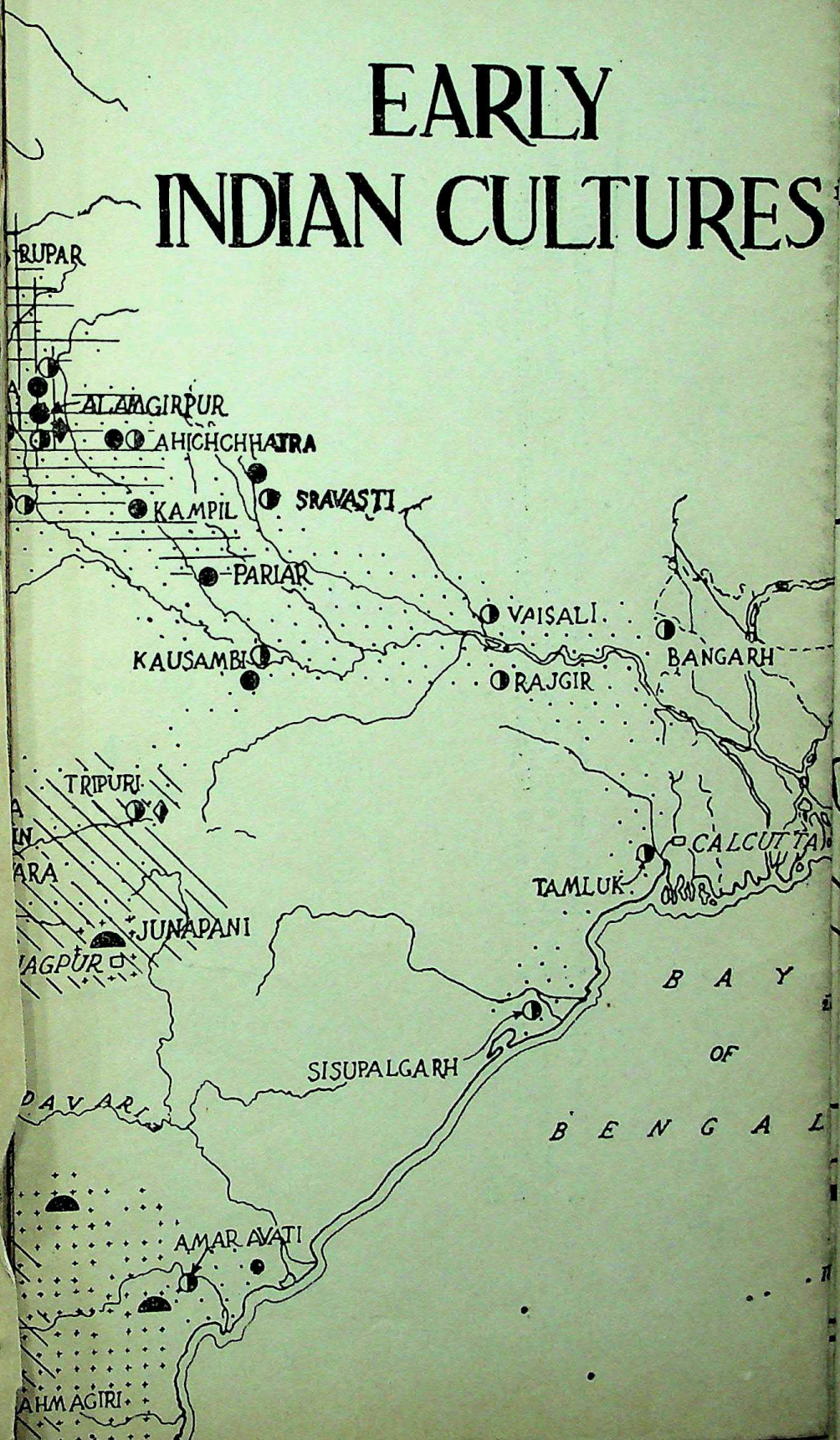
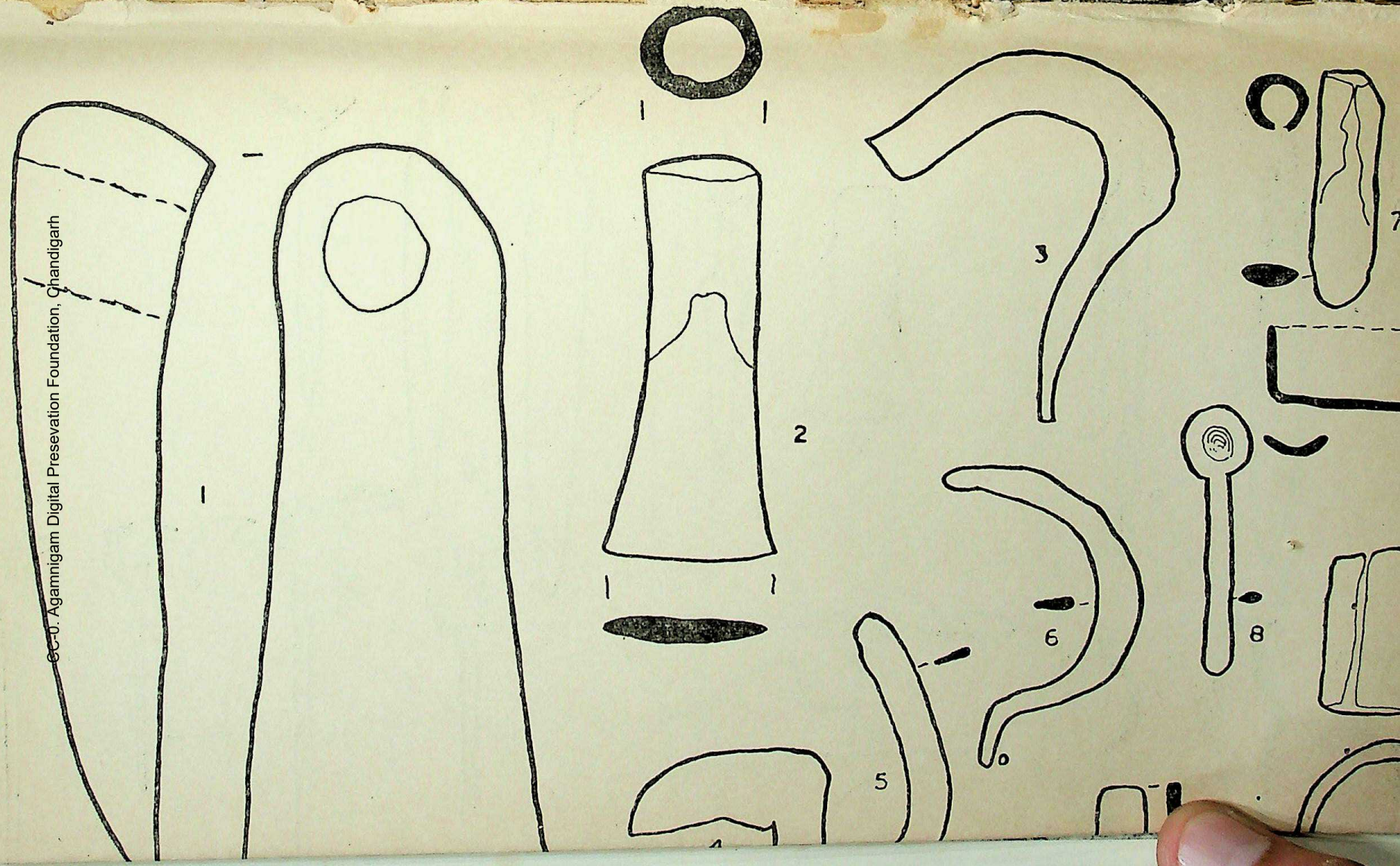
EARLY INDIAN CULTURES





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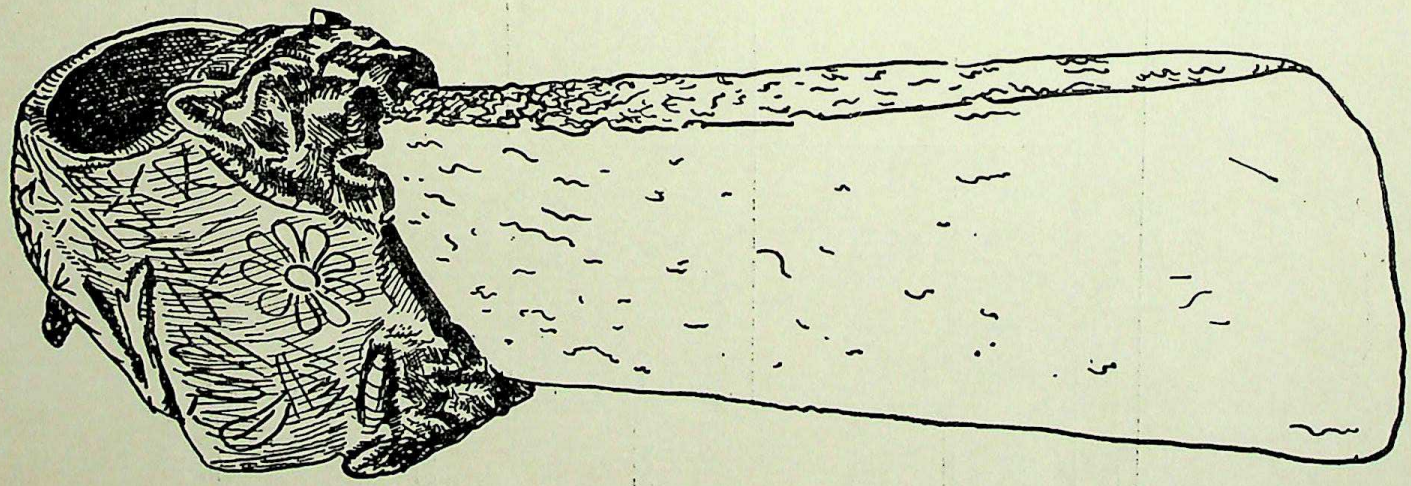

Fig. 22. *Axe with iron blade and bronze grip, from Ras Shamra. See page* 106.

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HARAPPA & PRE-H

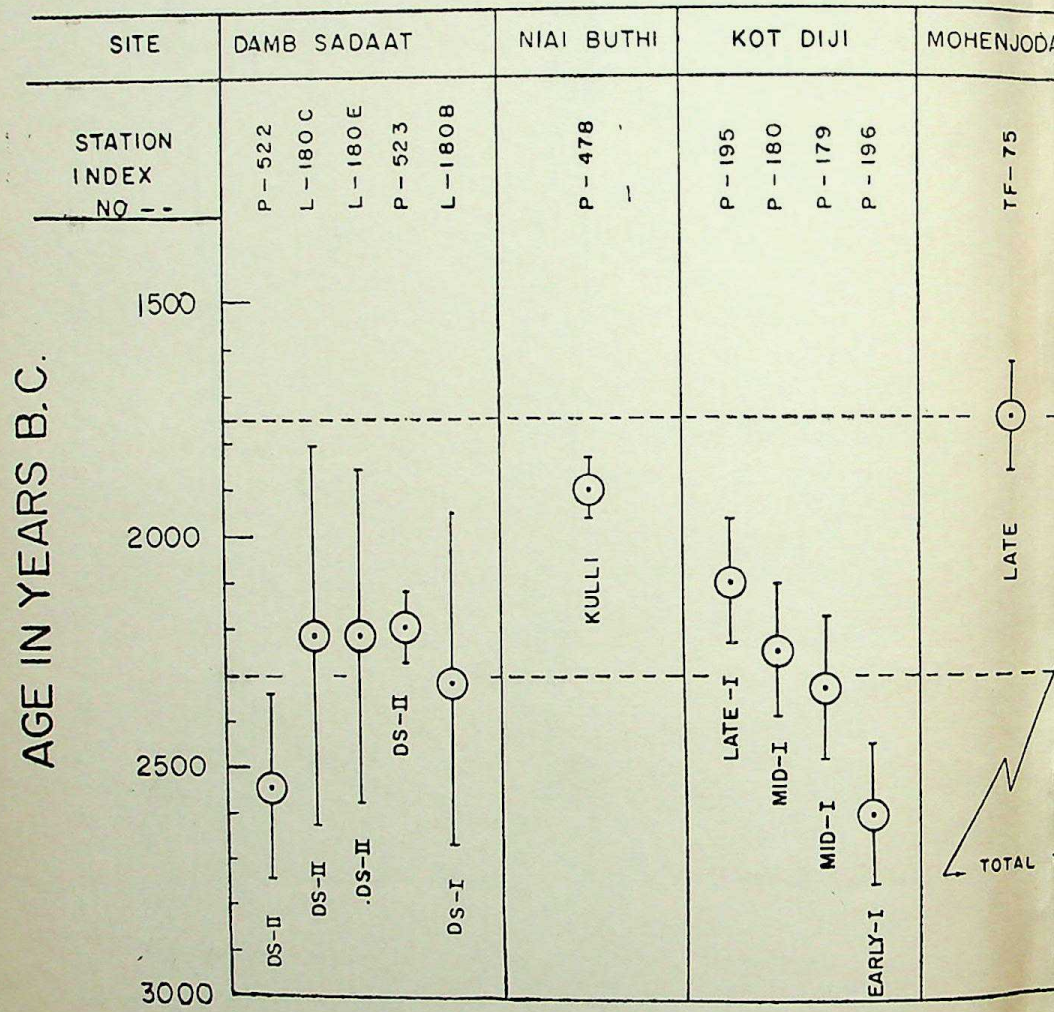

Fig. 23. *Radio-Carbon dates of Harap*

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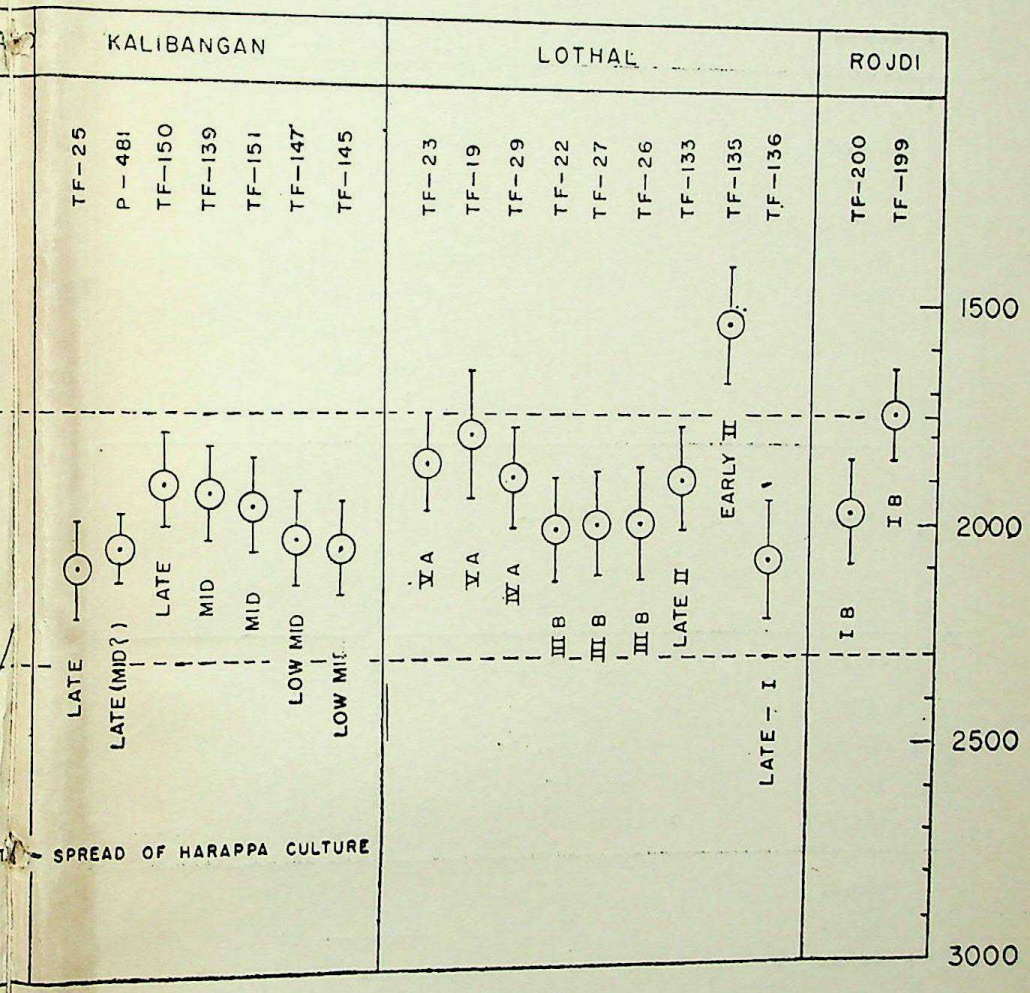
ARAPPA CULTURES.



a and Pre-Harappa cultures. *See page 223.*

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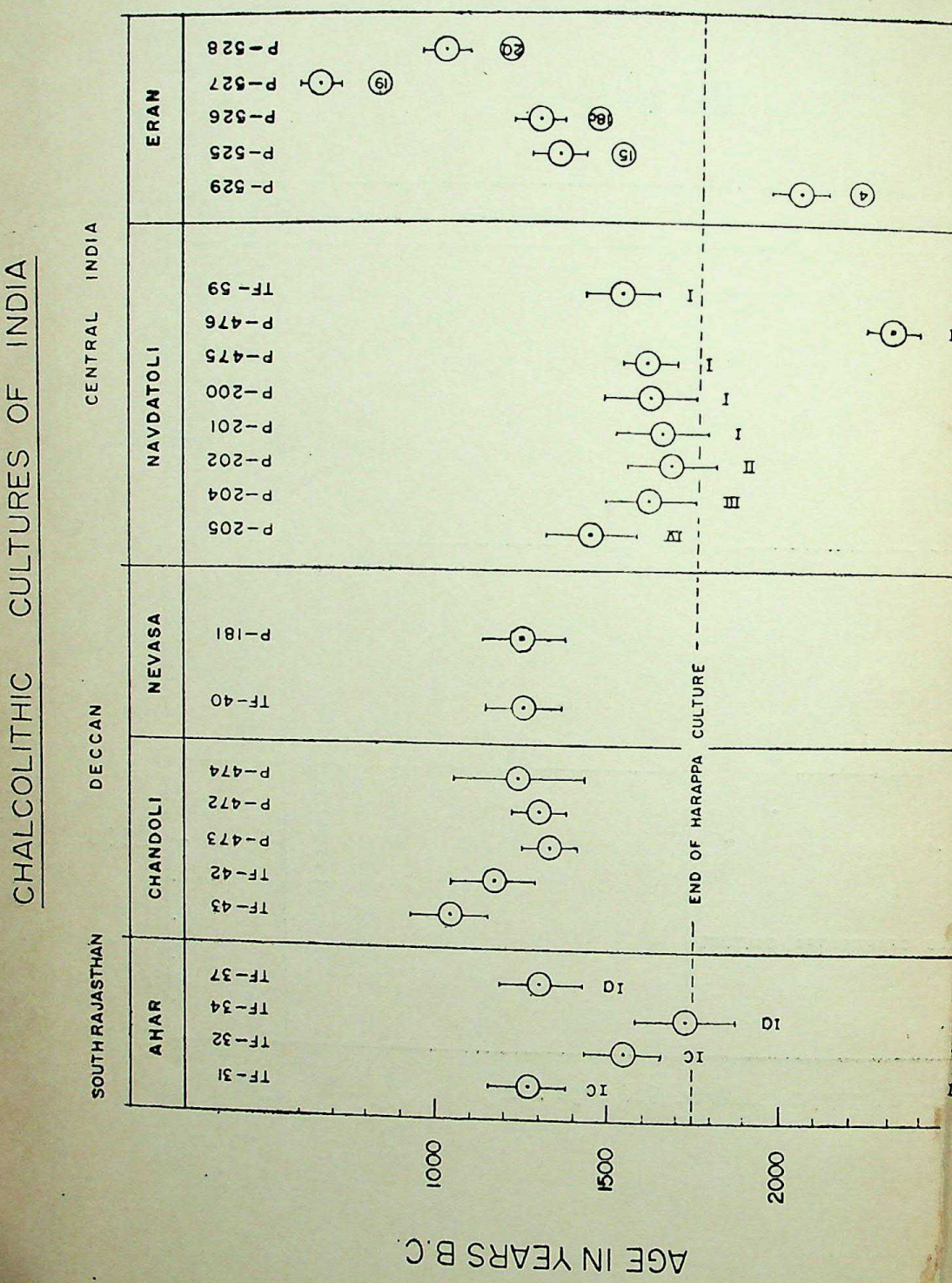

Fig. 24. *Radio-Carbon dates of chalcolithic cultures.* *See page 224.*

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TABLE—1

The Miscellany of Iron Objects (and Slags) from the Painted Grey Ware and Associated Levels

Objects	Hastinapura	Ujjain	Alamgirpur	Kausambi	Atranjikhera	Noh	Ahichchatra and Bairat
1. Slags	+	—	—	—	—	+ leaf-shaped	—
2. Arrow-head	—	+	+	—	+	— with socketed tang	—
3. Spear-head	—	+	+	—	+	+	—
4. Knife	—	+	—	—	—	—	—
5. Nail	+	—	+	—	—	—	—
6. Shapeless bits	—	—	—	+	—	—	+
7. Spade	—	+	—	—	—	—	—
8. Crowbar	—	+	—	—	—	—	—
9. Knife-blade	+	—	—	—	+	—	—
10. Dagger	—	—	—	—	+	—	—
11. Hoe	—	—	—	—	+	—	—
12. Fish-hook	—	—	—	—	+	—	—
13. Tong	—	—	—	—	+	—	—
14. Adze	—	—	—	—	+	—	—

TABLE—2

The Miscellany of Iron Objects in the Megaliths of South India

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Objects	MYSORE				KERALA	MADRAS						ANDHRA PRADESH				MAHARASHTRA
	Brahmagiri	Jadigenahalli	Hallur	T. Narsipur	Porkalam	Sanur	Kunnattur	Soutoukenny	Moutrapaleon	Adichanallur	Paiyampalli	Yelleswaram	Pochampad	Maski	Nagarjunakonda	Junapani
1. Arrow-head	+	—	+	—	—	—	—	—	—	—	—	—	—		—	—
2. Tanged arrow-head	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—
3. Barbed arrow-head	+	—	—	—	—	+	—	—	—	+	—	—	—		+	—
4. Spear	+ With flat blade and round shaft	—	—	—	—	+	—	—	+ Leaf-shaped with hollow socket base	—	—	—	—	—	—	—
5. Spear-head	—	—	+	—	—	+	—	—	—	+	—	—	—	—	+ Tanged	+
6. Lance	—	—	—	—	—	—	—	—	—	+	—	+	—	+	—	+
7. Javelin	+	—	—	—	—	—	—	—	—	+ Barbed	—	+		—	+	+
8. Sword	—	—	—	—	—	—	+	+ With double edges and midrib	+ Long	+ With double edges and hilt	—	+	—	+	+ Fragment with midrib	—
9. Dagger	—	+	—	+	+	+	—	—	+	+	—	+	+ With copper hilt	+	+	—
10. Hatchet	—	—	—	—	—	—	—	—	—	+ With double diagonal straps	—	—	—	—	—	—
11. Knife	+	—	—	—	—	+	—	+ Leaf-shaped	+	+	+	—	—	+	—	—
12. Blade	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—
13. Horse-bit	—	—	—	—	—	+	—	—	—	+	—	—	—	—	—	—
14. Chisel	—	—	—	—	—	—	—	—	—	+	—	—	—	+	—	—
15. Drill	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
16. Wedge	+	—	—	—	—	+	—	—	—	—	—	—	—	—	+	—
17. Axe	—	—	—	—	—	—	—	—	—	+	—	—	—	+	+	—
18. Adze	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	+ Resembling the strapped hatchet of Adichanallur
19. Sickle	—	+	—	—	—	+	—	+	—	—	+	+	—	—	—	—
20. Hook	—	—	—	—	—	+	—	—	—	+	—	—	—	+	—	—
21. Ferrule	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—
22. Spike	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—
23. Bar	—	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—
24. Nail	+	—	—	—	—	—	—	—	—	+	+	—	—	+	—	—
25. Trident	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
26. Ladle with a long handle	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+
27. Frying pan	—	+	—	—	—	—	—	—	—	+	—	—	—	—	—	—
28. Tripod stand	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
29. Spade	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
30. Crowbar	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
31. Bangle	—	—	—	—	—	—	—	—	—	—	—	—	—	+	—	—
32. Ring	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
33. Coiled bracelet	—	—	—	—	—	—	+	—	—	—	—	—	—	—	—	—

TABLE—3

The Miscellany of Iron Objects in the post-Chalcolithic-cum-Pre-N.B.P. Ware Levels

Objects	Nagda	Prakash	Remarks
1. Arrow-head with tang	+	+	The evidence at Bahal and Eran proves the occurrence of iron in these levels.
2. Arrow-head without tang	+	—	
3. Spear-head	+	—	
4. Dagger	+	—	
5. Axe	+	+	
6. Socketed Axe	+	—	
7. Knife-blade	+	+	
8. Blade	+	—	
9. Celt	+	—	
10. Sickle	+	+ (fragments)	
11. Spoon	+	—	
12. Nail	+	+	
13. Clamp	—	+ (fragments)	
14. Ring	+	—	

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TABLE—4

The Miscellany of Iron Objects in the Cairn-Burials of Irano-Pakistan Borderlands

Objects	Moghul Ghundai	Gatti	Jiwanri	Nasirabad	Zangian	Remarks
1. Arrow-head, leaf-shaped	+	—	—	—	—	The objects are mostly weapons of war, and are, in all suitable cases, tanged.
2. Arrow-head, with small point	+	—	—	—	—	
3. Triangular (or trilobate) barbed arrow-head	+	—	—	—	—	
4. Sword-blade	—	—	—	—	+ broken with bronze handle	
5. Dagger	+	—	—	—	—	
6. Knife	+	—	+	—	—	
7. Indeterminate fragments or pieces	+	+	+	+	+ Weapon with a bronze fastening	

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TABLE—5

The Miscellany of Iron Objects from Iran

Sites	Socketed splayed axe	Sword with hilt	Awl	Tanged dagger	Chisel	Spear-head	Arrow-head	Sickle	Horse-bit	Sword or dagger with ornate bronze handle
Agha Evlar	+	—	—	—	+	+ socketed	—	—	+ ornate	+
Chagoulla Derré	—	—	—	—	—	+ socketed	—	—	—	+
Sialk V A	—	—	+	+	—	+ tanged	—	—	—	—
Sialk VI B	—	+	—	+	—	+ tanged	+ tanged	+	+ plain	—

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TABLE—6

The Miscellany of Iron Objects in the N.B.P. Ware Levels

Objects	Taxila	Hastinapura	Rupar	Nasik	Nagda	Bahal
1. Dagger blade	+	—	+	—	+	+
2. Adze	+	—	—	—	—	—
3. Bowl	+	—	—	—	+	—
4. Spoon	+	—	—	—	—	—
5. Saucepan with looped handle	+	—	—	—	—	—
6. Straight-edged and convex-backed knife	+	—	—	—	—	—
7. Straight bladed and tanged dagger	+	—	—	—	—	—
8. Javelin	+	—	—	—	—	—
9. Arrow-head	+	+ Socketed and barbed	—	+ Leaf-shaped	—	+
10. Elephant goad	+	—	—	—	—	—
11. Socketed axe	+	—	—	—	—	—
12. Chisel	+	+	—	+ Circular Cross-section	+ *Khaḍga* shaped	—
13. Knife	+	—	+	+ Concavo-convex	+	+
14. Gold- or silver-smith's tong	+	—	—	—	—	—
15. Smith's anvil	+	—	—	—	—	—
16. Nails	+	—	+	+	—	+
17. Socketed and plain hoe	+	—	—	—	—	—
18. Bracelet	—	+ Unconnected ends	—	—	—	—
19. Hook	—	—	+	—	—	—
20. Bars	—	—	+	—	—	—
21. Spike	—	—	+	—	—	—
22. Handle	—	—	+ With socket	—	—	—
23. Sickle	—	—	+	—	+	+
24. Spear-head	—	—	+	—	—	+
25. Caltrop	—	—	—	+	—	—
26. Chopper	—	—	—	+	—	—
27. Drill	—	—	—	+	—	—
28. Lamp or ladle	—	—	—	+	—	—
29. Ring	—	—	—	+	—	—

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